

The George
Washington
University
Bulletin

Undergraduate
Programs
2002-2003



THE GEORGE WASHINGTON UNIVERSITY BULLETIN

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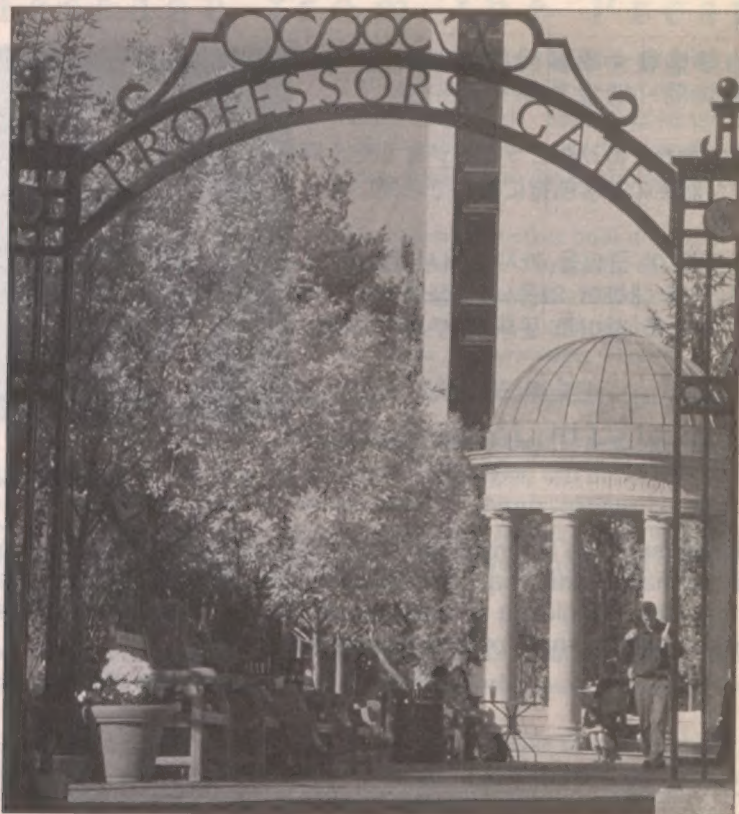
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THE GEORGE WASHINGTON UNIVERSITY BULLETIN



UNDERGRADUATE PROGRAMS 2002-2003

Columbian College of Arts and Sciences
School of Business and Public Management
School of Engineering and Applied Science
Elliott School of International Affairs
School of Medicine and Health Sciences
School of Public Health and Health Services

Please address correspondence to the office concerned at The George Washington University, Washington, D.C. 20052; telephone (202)994-1000. See page 16 in this Bulletin for a brief directory of University offices. For information concerning Graduate Programs, the Law School, or the Summer Sessions, or for more comprehensive information on the School of Medicine and Health Sciences or the School of Public Health and Health Services, please request the appropriate Bulletin or see our website.

www.gwu.edu

喬治華盛頓大學願回答你的問題，如果書內沒有解答，請用英文書面詢問。地址見第一頁。

お問い合わせありがとうございました。同封の大学ガイドで不明の点は1ページ記載の各学部宛に英語でお問い合わせ下さい。

저희 대학에 관심을 가져주셔서 감사합니다. 혹시 이 책자에서 언급되지 않은 면에 대하여 의문나는 점이 있으시면 앞에 명기된 조지 워싱턴 대학교 주소로 영어로 문의해 주시기 바랍니다.

جامعة جورج واشنطن ترحب بكم وتشكر لكم اهتمامكم. برجاء الكتابة إلينا باللغة الانجليزية على عنواننا بالصفحة الأولى إذا كان لديكم أية استفسارات أخرى.

La Universidad de George Washington le agradece su interés. Si necesita información adicional a la incluida en este Boletín, por favor, dirijase por escrito, en inglés, a la dirección de George Washington University indicada en la primera página de esta publicación.

Information in this bulletin is generally accurate as of fall 2001. The University reserves the right to change courses, programs, fees, and the academic calendar, or to make other changes deemed necessary or desirable, giving advance notice of change when possible.

Program information needed to fulfill a major or field appears under the name of the department or program concerned in Columbian College of Arts and Sciences and the Elliott School of International Affairs. For the School of Business and Public Management and the School of Engineering and Applied Science, program information appears under the school's entry.

Depending on the degree program, students must fulfill program requirements stated in the bulletin in effect at the time they matriculate or declare their major. Any subsequent changes in programs that may appear in future bulletins do not affect the program a student has already entered.

The entries under Courses of Instruction represent departments and programs, rather than all categories of courses taught. For example, to find Chinese, Japanese, Korean, or Vietnamese courses, look under East Asian Languages and Literatures; to find French, Italian, Portuguese, or Spanish courses, look under Romance Languages and Literatures.

Message from the President



If you remember your Latin—it was required of all GW students until 1908—you may recall that *bullā* meant a small ball. From that we get *ballot* and *bullet*—and *bulletin*, which originally meant a brief notice, hurled into the public noise—like a bullet.

This bulletin is neither brief nor small. We have too much to tell you. For to flip through these pages is to see the extraordinary depth and variety of the experience at GW, a community of scholars exploring every area of knowledge, whether as small as the neutron or big as the Net.

Especially in this year it is also a reassuring sign of continuity. The events of last fall were both challenging and unbearably sad, creating a period in which for a while we seemed unable to absorb anything but what was on CNN. It was a time when we mourned alumni and friends lost in Washington and New York—and wondered whether students would shy away from applying to this school a few blocks from the White House.

In fact, the number of applications shot up. It was as if students dug in their heels, saying terrorists would not keep them from the university they most wanted to attend.

And now, this bulletin reminds us that even in the middle of crisis, learning goes on. The faculty at GW continue to explore the frontiers of human endeavor—and transmit what they've learned to those just beginning to explore.

Such activity goes on at a campus that is simply blossoming. Students who are with us in the year ahead will see us making full use of the new, fully functional Media and Public Affairs building, the new Lerner Family Health and Wellness Center, the new Elliott School. In this, our 90th year in Foggy Bottom and tenth at Loudoun-Dulles, we are transforming our Mount Vernon campus, thus extending our capacity to serve.

But despite the large implications we draw from this year's bulletin, the most important implication is the meaning it has for each of you. For contained within these covers are the descriptions of courses that, as they spread out over a year, will form the bulk of your own personal exploration at GW.

Approach these pages with all the care and thoughtfulness you can provide; it will provide you with a great education. If you use it well, it can have a lot of impact, just like a Florida ballot. And you'll have a ball. Maybe we haven't moved away from Latin as much as we think.

Best wishes.

Stephen Joel Trachtenberg

Stephen Joel Trachtenberg
President

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THE ACADEMIC CALENDAR 2002-2003

August 2002	September 2002	October 2002	November 2002
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S
1 2 3	1 2 3 4 5 6 7	1 2 3 4 5	1 2
4 5 6 7 8 9 10	8 9 10 11 12 13 14	6 7 8 9 10 11 12	3 4 5 6 7 8 9
11 12 13 14 15 16 17	15 16 17 18 19 20 21	13 14 15 16 17 18 19	10 11 12 13 14 15 16
18 19 20 21 22 23 24	22 23 24 25 26 27 28	20 21 22 23 24 25 26	17 18 19 20 21 22 23
25 26 27 28 29 30 31	29 30	27 28 29 30 31	24 25 26 27 28 29 30
December 2002	January 2003	February 2003	March 2003
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5 6 7	1 2 3 4	1	1
8 9 10 11 12 13 14	5 6 7 8 9 10 11	2 3 4 5 6 7 8	2 3 4 5 6 7 8
15 16 17 18 19 20 21	12 13 14 15 16 17 18	9 10 11 12 13 14 15	9 10 11 12 13 14 15
22 23 24 25 26 27 28	19 20 21 22 23 24 25	16 17 18 19 20 21 22	16 17 18 19 20 21 22
29 30 31	26 27 28 29 30 31	23 24 25 26 27 28	23 24 25 26 27 28 29
			30 31
April 2003	May 2003	June 2003	July 2003
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5	1 2 3	1 2 3 4 5 6 7	1 2 3 4 5
6 7 8 9 10 11 12	4 5 6 7 8 9 10	8 9 10 11 12 13 14	6 7 8 9 10 11 12
13 14 15 16 17 18 19	11 12 13 14 15 16 17	15 16 17 18 19 20 21	13 14 15 16 17 18 19
20 21 22 23 24 25 26	18 19 20 21 22 23 24	22 23 24 25 26 27 28	20 21 22 23 24 25 26
27 28 29 30	25 26 27 28 29 30 31	29 30	27 28 29 30 31

2002 Fall Semester

August 29-30	Advising and testing begin for entering students
September 3	Classes begin
September 3-13	Late registration
October 1	Applications due for winter graduation
October 30	Registration for spring semester classes begins*
November 28-29	Thanksgiving holiday
December 9	Last day of regular fall semester classes
December 10	Makeup classes
December 11-12	Reading period
December 13-21	Examination period

2003 Spring Semester

January 10	Advising and testing for entering students
January 13	Classes begin
January 13-24	Late registration
January 20	Martin Luther King, Jr., Day (holiday)
February 1	Applications due for May graduation
February 17	George Washington's birthday observed (holiday)
March 17-21	Spring recess
March 26	Registration for fall semester classes begins*
April 29	Makeup classes
April 30	Last day of regular spring semester classes
	Designated Monday
May 1-2	Reading period
May 5-13	Examination period
May 18	Commencement

*Registration dates are tentative; consult the *Schedule of Classes*.

The University

PRESIDENTS OF THE UNIVERSITY

1821-1827	William Staughton
1828-1841	Stephen Chapin
1843-1854	Joel Smith Bacon
1855-1858	Joseph Getchell Binney
1859-1871	George Whitefield Samson
1871-1894	James Clarke Welling
1894-1895	Samuel Harrison Greene, <i>Acting</i>
1895-1900	Benaiah L. Whitman
1900-1902	Samuel Harrison Greene, <i>Acting</i>
1902-1910	Charles Willis Needham
1910-1918	Charles Herbert Stockton
1918-1921	William Miller Collier
1921-1923	Howard L. Hodgkins, <i>ad interim</i>
1923-1927	William Mather Lewis
1927-1959	Cloyd Heck Marvin
1959-1961	Oswald Symister Colclough, <i>Acting</i>
1961-1964	Thomas Henry Carroll
1964-1965	Oswald Symister Colclough, <i>Acting</i>
1965-1988	Lloyd Hartman Elliott
1988-	Stephen Joel Trachtenberg

ABOUT THE UNIVERSITY

George Washington was determined to have a great national university in the nation's capital. His hope was that students from all parts of the country would gain a first hand knowledge of the practice as well as the theory of republican government while being instructed in the arts and sciences. He bequeathed 50 shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." Despite Washington's intentions, The Potomac Company folded and Congress never extended a "fostering hand," so the University did not take shape until a group of Baptist clergymen led by Reverend Luther Rice took up the cause. They raised funds for the purchase of a site and petitioned Congress for a charter. Congress insisted on giving the institution a non-sectarian charter which stated "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

Columbian College, as it was originally named, took up residence on College Hill, a 46-acre tract between the present 14th and 15th Streets extending from Florida Avenue to Columbia Road. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University.

By 1918, the University had moved to the Foggy Bottom neighborhood—between 19th and 24th Streets, south of Pennsylvania Avenue—in the heart of Washington, D.C. The more than 90 buildings, including 14 residence halls, are situated on 43 acres bordered by the White House, the John F. Kennedy Center for the Performing Arts, the State Department, and the World Bank, as well as numerous federal agencies, national galleries and museums.

GW's Virginia Campus, initiated for graduate studies, research projects, and professional development programs, is located along the high-tech corridor on Route 7, just to the west of Route 28, in Loudoun County. In 1998, GW established The George Washington University at Mount Vernon College in order to offer unique living and learning opportunities for women. GW's Mount Vernon Campus is located on Foxhall Road in Northwest Washington.

Currently, the University's enrollments total more than 20,000, of which over 8,000 are undergraduate students, over 10,000 are graduate and professional students, and about 1,600 are nondegree students. The students come from all 50 states and 139 different countries.

Mission Statement

The George Washington University, an independent academic institution chartered by the Congress of the United States in 1821, dedicates itself to furthering human well-being. The University values a dynamic, student-focused community stimulated by cultural and intellectual diversity and built upon a foundation of integrity, creativity, and openness to the exploration of new ideas.

The George Washington University, centered in the national and international crossroads of Washington, D.C., commits itself to excellence in the creation, dissemination, and application of knowledge.

To promote the process of lifelong learning from both global and integrative perspectives, the University provides a stimulating intellectual environment for its diverse students and faculty. By fostering excellence in teaching, the University offers outstanding learning experiences for full-time and part-time students in undergraduate, graduate, and professional programs in Washington, D.C., the nation, and abroad. As a center for intellectual inquiry and research, the University emphasizes the linkage between basic and applied scholarship, insisting that the practical be grounded in knowledge and theory. The University acts

as a catalyst for creativity in the arts, the sciences, and the professions by encouraging interaction among its students, faculty, staff, alumni, and the communities it serves.

The George Washington University draws upon the rich array of resources from the National Capital Area to enhance its educational endeavors. In return, the University, through its students, faculty, staff, and alumni, contributes talent and knowledge to improve the quality of life in metropolitan Washington, D.C.

The Schools

The George Washington University includes nine academic units, as follows:

Columbian College of Arts and Sciences offers programs leading to the degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Fine Arts, Bachelor of Music, Master of Arts, Master of Fine Arts, Master of Forensic Sciences, Master of Public Policy, Master of Science, Master of Science in Forensic Science, Master of Philosophy, Doctor of Philosophy, and Doctor of Psychology.

The School of Medicine and Health Sciences offers programs leading to the degrees of Bachelor of Science in Health Sciences, Master of Science in Health Sciences, and Doctor of Medicine.

The Law School offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of Juridical Science.

The School of Engineering and Applied Science offers programs leading to the degree of Bachelor of Science in the following areas: civil engineering, computer engineering, computer science, electrical engineering, mechanical engineering, and systems engineering; and Bachelor of Arts in the areas of applied science and technology and of computer science. Graduate programs lead to the degrees of Master of Science, Master of Engineering Management, Engineer, Applied Scientist, and Doctor of Science.

The Graduate School of Education and Human Development offers programs leading to the degrees of Master of Arts in Education and Human Development, Master of Arts in Teaching, Master of Education, Education Specialist, and Doctor of Education.

The School of Business and Public Management offers programs leading to the degrees of Bachelor of Accountancy, Bachelor of Business Administration, Master of Accountancy, Master of Business Administration, Master of Public Administration, Master of Public Policy, Master of Science in Finance, Master of Science in Information Systems Technology, Master of Science in Project Management, Master of Tourism Administration, and Doctor of Philosophy.

The Elliott School of International Affairs offers programs leading to the degrees of Bachelor of Arts, Master of Arts, Master of International Policy and Practice, and Master of International Studies.

The School of Public Health and Health Services offers programs leading to the degrees of Bachelor of Science, Master of Science, Master of Public Health, Master of Health Services Administration, Specialist in Health Services Administration, and Doctor of Public Health.

The College of Professional Studies has been authorized to offer programs leading to the degrees of Associate in Professional Studies, Bachelor of Professional Studies, and Master of Professional Studies.

Accreditation

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Board.

The Law School is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association.

The School of Medicine and Health Sciences has had continuous approval by its accrediting body, which is currently the Liaison Committee on Medical Education, sponsored jointly by the American Medical Association and the Association of American Medical Colleges. The clinical laboratory science program is accredited by the National Accrediting Agency for Clinical Laboratory Science. The Commission on Accreditation of Allied Health Education Programs has accredited the health sciences programs in diagnostic medical sonography and physician assistant and the athletic training concentration in exercise science in the School of Public Health and Health Services. The public health programs have full accreditation from the Council on Education for Public Health. The program in health services administration is accredited by the Accrediting Commission on Education for Health Services Administration.

All Bachelor of Science engineering curricula of the School of Engineering and Applied Science are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The Bachelor of Science computer science curriculum is accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board.

The Graduate School of Education and Human Development is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its eligible master's and doctoral degree programs; the master's programs in school and community counseling and the doctoral program in counseling are accredited by the Council for the Accreditation of Counseling and Related Educational Programs; the master's program in rehabilitation counseling is accredited by the Council on Rehabilitation Education.

The School of Business and Public Management joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of AACSB International—The Association to Advance Collegiate Schools of Business; the Association accredited its undergraduate program in 1977 and its master's program in 1982. The programs in accountancy satisfy the educational requirements for the Certified Public Accountant and the Certified Management Accountant professional examinations. The Master of Public Administration program is on the approved list of the National Association of Schools of Public Affairs and Administration.

The Elliott School of International Affairs is a member of the Association of Professional Schools of International Affairs.

The Bachelor of Fine Arts with a major in interior design is accredited by the Foundation for Interior Design Education Research. The Department of Chemistry is on the approved list of the American Chemical Society. The Department of Music is an accredited member of the National Association of Schools of Music. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The graduate program in speech-language pathology is accredited by the Education and Training Board of the Boards of Examiners in Speech-Language Pathology and Audiology.

The Board of Trustees of the University

The University is privately endowed and is governed by a Board of Trustees of which the President of the University is an *ex officio* member. Trustees who are GW alumni are indicated by an asterisk. Locations are indicated for trustees outside the Washington metropolitan area.

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Columbian College of Arts and Sciences—Interim Dean Jean Folkerts; Executive Associate Dean Edward Alan Caress; Associate Deans F. Christopher Arterton, Norayr Krikor Khatcheressian, Kim Moreland, Michael Moses, Mary Anne Plastino Saunders

School of Medicine and Health Sciences—Dean John Franklin Williams, Jr.; Senior Associate Deans Mark Batshaw, Jean E. Johnson; Associate Deans Stephen Evans, Rhonda M. Goldberg, Brian J. McGrath, W. Scott Schroth, James L. Scott

- Law School**—*Dean* Michael K. Young; *Senior Associate Dean* Roger H. Trangsrud; *Associate Deans* Alfreda Robinson, Eric Scott Sirulnik, Ralph Gustav Steinhardt, Robert V. Stanek, Thomas A. Morrison, Renee Y. DeVigne, Scott B. Pagel, Raj K. Bhala, Richard J. Pierce
- School of Engineering and Applied Science**—*Dean* Timothy Tong; *Associate Dean* Rachelle Silverman Heller
- Graduate School of Education and Human Development**—*Dean* Mary Hatwood Futrell; *Associate Deans* Janet Craig Heddesheimer, Robert Nicholas Ianacone
- School of Business and Public Management**—*Dean* Susan Phillips; *Senior Associate Dean* D. Jeffrey Lenn; *Associate Deans* Joel W. Cook, Debra R. Sheldon
- Elliott School of International Affairs**—*Dean* Harry Harding; *Associate Deans* Harvey B. Feigenbaum, Barbara Diane Miller
- School of Public Health and Health Services**—*Interim Dean* Richard M. Fairfax Southby; *Senior Associate Dean* Daniel Allen Hoffman
- College of Professional Studies**—*Dean* Roger Whitaker

The Faculty Senate

In addition to the elected members listed below, the President of the University is *ex officio*; the Vice President for Academic Affairs, the University Registrar, and the deans of the schools are administrative members; and a parliamentarian is selected by the Faculty Senate.

- Lilien Filipovitch Robinson, *Professor of Art and Chair of the Executive Committee*
- Michael Scott Castelberry, *Professor of Special Education*
- James Francis Cawley, *Professor of Prevention and Community Health*
- Salvatore Frank Divita, *Professor of Marketing*
- Paul Brooks Duff, *Associate Professor of Religion*
- Linda Lou Gallo, *Professor of Biochemistry and Molecular Biology*
- John L. Glascock, *Professor of Finance*
- William Byron Griffith, *Professor of Philosophy*
- Murli Manohar Gupta, *Professor of Mathematics*
- Muhammad Ikramul Haque, *Professor of Engineering and Applied Science*
- Robert Joseph Harrington, *Professor of Engineering and Applied Science*
- Carol Hren Hoare, *Professor of Human Development and Human Resource Development*
- Gerald Philip Johnston, *Professor of Law*
- R. Emmet Kennedy, *Professor of European History*
- Gregory E. Maggs, *Professor of Law*
- David Willard McAleavey, *Professor of English*
- Bernard Matthew Mergen, *Professor of American Civilization*
- J. Houston Miller, *Professor of Chemistry*
- Thomas J. Nagy, *Associate Professor of Expert Systems*
- Joseph Pelzman, *Professor of Economics*
- Gary Leonard Simon, *Professor of Medicine*
- Richard Thornton, *Professor of History and International Affairs*
- Lynda L. West, *Professor of Special Education*
- Arthur Edward Wilmarth, Jr., *Associate Professor of Law*
- Anthony Marvin Yezer, *Professor of Economics*
- Mona Elwakkad Zaghloul, *Professor of Engineering and Applied Science*

Directory of University Offices

General Information (202)994-4949

Administrative Offices

President	Rice Hall 802	(202)994-6500
Board of Trustees	Rice Hall 801	(202)994-8610
Vice President for Academic Affairs	Rice Hall 813	(202)994-6510
Vice President for Advancement	2129 I Street, NW	(202)994-6415
Vice President for Communications	Rice Hall 504	(202)994-8810
Vice President and General Counsel	2100 Penn Ave., #525	(202)994-6503
Vice President for Health Affairs	Ross Hall 713	(202)994-4356
Vice President for Student and Academic Support Services	Rice Hall 402	(202)994-7210
Vice President and Treasurer	Rice Hall 701	(202)994-6600
Columbian School of Arts and Sciences	Phillips 107	(202)994-6210
School of Business and Public Management	Government 206	(202)994-6380
Graduate School of Education and Human Development	2134 G Street, NW	(202)994-6160
School of Engineering and Applied Science	Tompkins Hall 110	(202)994-6080
Elliott School of International Affairs	Lisner Hall 640	(202)994-6240
Law School	Lerner 102	(202)994-6288
School of Medicine and Health Sciences	Ross Hall 713	(202)994-3506
School of Public Health and Health Services	Ross Hall 125	(202)994-5179
College of Professional Studies	805 21st Street, NW	(202)994-2083

Student Services Offices

Career Center	1922 F Street, NW	(202)994-6495
Community Living and Learning Center	Fulbright Hall 104	(202)994-8345
Counseling Center	2033 K Street, NW, #330	(202)994-5300
Dean of Students	Rice Hall 401	(202)994-6710
Disability Support Services	Marvin Center 436	(202)994-8250
Fellowships and Graduate Student Support	Rice Hall 603	(202)994-6822
Gelman Library	2130 H Street, NW	(202)994-6845
Graduate Student Enrollment Management	Rice Hall 602	(202)994-5984
GW Bookstore	Marvin Center	(202)994-6870
Housing Services	Fulbright Hall 104	(202)994-6688
Information Technology Services	Rome B101	(202)994-5530
International Services	2127 G Street, NW	(202)994-6860
Mount Vernon Campus	2100 Foxhall Road, NW	(202)242-6602
Office of University Students	812 20th Street, NW	(202)994-1972
Student Accounts Services	Rome 102	(202)994-7350
Student Activities Center	Marvin Center 427	(202)994-6555
Student Financial Assistance	Rice Hall 310	(202)994-6620
Summer, Special, and International Programs	812 20th Street, NW	(202)994-6360
Undergraduate Admissions	Rice Hall 2nd Floor	(202)994-6040
University Honors Program	2138 G Street, NW	(202)994-6816
University Registrar	Rice Hall 101	(202)994-4900
Virginia Campus	Ashburn, VA	(703)729-8200

ADMISSIONS

The University reviews applications for admission each semester and summer session. Admission is based on evidence of potential for successful study and on available space in the entering class. The following criteria are considered: the strength of the courses taken and the grades achieved in secondary school and/or college, standardized test scores, relationship between grades and test scores, essays, recommendations, and extracurricular activities.

The application for admission to degree candidacy has two parts. The Application: Part I should be requested well in advance of the semester for which the student seeks admission; specific dates are given in the section below. The Application: Part II is mailed to the applicant after receipt of Part I. Application forms should be requested from and returned to the Office of Admissions, The George Washington University, Washington, D.C. 20052. A \$60 nonrefundable application fee is charged.

Secondary School Students

Freshmen—Regular Decision

Preference for places in the entering class will be given to students who submit the Application: Part 1 by December 1 and Part 2 with required credentials by January 15. Students who wish to begin college in the spring semester should submit Part 1 of the application by October 1 and Part 2 by November 1.

Applicants from secondary schools must arrange to have sent directly from their schools to the Office of Admissions a complete academic record together with a teacher recommendation and a counselor recommendation. This information should be supplied on the appropriate forms in the application packet. Before enrolling, incoming freshmen must provide a complete high school record showing final grades and graduation.

For Columbian College of Arts and Sciences, the School of Business and Public Management, and the Elliott School of International Affairs: The high school record must include, at minimum, four years of English; at least two years of one foreign language; two years of science, preferably with laboratory instruction; two years of social studies, one of which must be American history; and one year of college-preparatory mathematics beyond introductory algebra.

In the School of Engineering and Applied Science, Bachelor of Arts programs require the same high school preparation as stated in the paragraph above, except that two years of college-preparatory mathematics beyond introductory algebra are required. The following preparation is required of Bachelor of Science students in the School of Engineering and Applied Science: four years of English; four years of mathematics, including two years of algebra, one year of plane geometry, one-half year of trigonometry, and one-half year of precalculus, analytic geometry, or functions; one year each of physics and chemistry (general science courses do not satisfy this requirement); and two years of history or a foreign language.

Entrance Examinations—Applicants from secondary schools must submit scores on the College Board Scholastic Assessment Test (SAT I) or on the American College Testing (ACT) battery. Submission of scores on College Board SAT II in writing and mathematics is recommended. Score reports must be sent directly to the Office of Admissions from the testing agency.

Admission to the Bachelor of Music curriculum requires, in addition to the above, a performance audition (a tape is acceptable) and/or music testing.

Freshmen—Early Decision I

High school seniors applying for fall admission as full-time freshmen with The George Washington University as their first choice may wish to take

advantage of the Early Decision I option. To apply for Early Decision I, submit the Application: Part 1 by November 1 and Part 2 with supporting credentials by December 1; we will mail our decision in mid-December. If accepted, you are required to send in your declaration of intent to attend GW, together with appropriate nonrefundable deposits, no later than January 15 and to withdraw all applications for admission to other colleges and universities.

Freshmen—Early Decision II

If you decide after our Early Decision I deadline that GW is your first choice, our Early Decision II option may be best for you. To apply for Early Decision II, submit the Application: Part 1 by December 1 and Part 2 with supporting credentials by January 15. We will mail our decision in early February. If accepted, you are required to send in your declaration of intent to attend GW, together with appropriate nonrefundable deposits, no later than March 1 and to withdraw all applications for admission to other colleges and universities.

Freshmen—Early Admission for High School Juniors

Exceptionally well-prepared students who will complete the junior year in high school may apply for early admission. This option is designed for students with the emotional maturity, as well as the academic ability and background, necessary for college entrance. In most cases, applicants accepted for early admission have exhausted academic offerings in secondary school to the extent that remaining for the senior year may not be in the best interests of the students.

To be considered for early admission, students must

1. demonstrate superior academic performance through the junior year of high school;
2. meet the entrance requirements of the school or division applied to, by completing all required entrance units with the possible exception of the fourth year of English;
3. have the unqualified recommendation of the secondary school principal or counselor;
4. submit two letters of recommendation (in addition to the counselor's) from teachers who can testify to the student's maturity and general readiness to enter college;
5. submit a letter from a parent or guardian supporting early college entrance;
6. take SAT I or ACT plus SAT II subject tests in writing and mathematics and one other SAT II subject test (of the student's choice) and arrange to have the scores sent directly to the Office of Admissions by the testing agency;
7. arrange for an interview with an admissions officer.

Students from Foreign Institutions

Applications, required records, and scores on the Test of English as a Foreign Language (see below) and SAT I should be received from international students no later than January 15 for the fall semester and October 1 for the spring semester.

Required Records—At the time the application is sent, students must have the educational institutions previously attended send directly to the GW Office of Admissions copies of official certificates and records listing subjects studied, grades received, examinations taken, and degrees received. Certified copies of diplomas and certificates from all secondary schools, colleges, and universities attended are required. Records of state examinations and certificates are also required. These records become the property of the University and cannot be returned. These documents should be in the language in which the institution keeps its official records. If they are in a language other than English, the copies sent should be accompanied by a certified English translation.

Language Tests—All applicants whose first language is not English are required to take the SAT II English Language Proficiency Test or the Test of English as a Foreign Language (TOEFL), preferably with the Test of Written English (TWE). In considering candidates for admission, the University looks for a TOEFL score of 550 or above (paper-based) or 213 or above (computer-based). The School of Business and Public Management requires a minimum score of 600 (paper-based) or 250 (computer-based) on a second taking of the TOEFL. Applicants are responsible for making arrangements to take the test by addressing inquiries to TOEFL, P.O. Box 6151, Princeton, N.J. 08541-6151. The completed registration form must be returned well in advance of the semester for which admission is sought. TOEFL scores may not be more than two years old. On the application for the TOEFL, students should specify that the scores be sent to the GW Office of Admissions.

Admitted students whose first language is not English are also required to take an English as a Foreign Language placement test prior to registering at the University; the placement test is waived for students with a TOEFL score of at least 600 (paper-based) or 250 (computer-based). Depending on the results of this test, the student's academic program may be restricted in number and type of courses that can be taken. Students who are required to take English as a Foreign Language courses at an intensive level might not be able to take other courses during that semester. College credit is not granted for English study below the level of standard freshman English courses.

Financial Certificate—A Financial Certificate and Bank Letter must be completed and submitted with the application for admission of all international students planning to study at the University under the authorization of either a student (F) or exchange visitor (J) visa. Satisfactory completion and submission of the Financial Certificate and Bank Letter are required for the issuance of a Form I-20 or IAP-66.

Readmission

Previously registered students who wish to resume studies on campus after discontinuing enrollment for one or more semesters (summer sessions excluded) must apply for readmission. Deadlines for readmission applications from students in good academic standing are the same as those for transfer students. Students seeking readmission after having attended other institutions of higher education in the interim must have complete official transcripts sent to the Office of Admissions from all other institutions attended. Students seeking readmission as degree candidates after previous enrollment in nondegree status must submit a standard undergraduate degree application and fee, together with **all entrance credentials not previously received or required.**

Applicants for readmission are subject to the University regulations in effect at the time of readmission.

The application fee is waived for students applying for readmission after previous enrollment as degree candidates at this University if they have not since registered at another institution.

Transfer Students

To be considered for fall admission, undergraduate students from other institutions should submit the Application: Part 1 by May 1 and Part 2 with required credentials by June 1. Corresponding dates for spring are October 1 and November 1; for summer, March 1 and April 1.

A transfer applicant should be in good standing as to scholarship and conduct at all postsecondary institutions previously attended. An applicant who has attended one or more institutions of higher education must request each registrar to mail directly to the Office of Admissions a transcript of his or her

record, even if credits were not earned or if advanced standing is not desired. In addition, an applicant must have his or her high school record and College Board or ACT test scores sent to the Office of Admissions directly from the high school and testing agency. For more detailed transfer admission requirements, see the appropriate school in this Bulletin.

Policies on Assignment of Credit for Transfer Students

Where there is no duplication involved, either through course work or examination, credit may be granted for work successfully completed at other institutions of higher learning. Assignment of transfer credit will depend on the appropriateness of the courses completed elsewhere, the standing of the institution at which the previous work was completed, and the regulations of the school of this University in which the credit is to be applied toward a degree. Transfer credit must satisfy the requirements for the degree sought as stated in this Bulletin. Credit may be accepted provisionally or may require validation by examination or completion of higher-level courses in the same sequence. Transfer credit will not be assigned for courses completed with a low-pass grade (*D* or the equivalent); course work completed in vocational/technical programs (e.g., secretarial studies); or sub-freshman-level remedial work. Each school reserves the right to refuse credit for transfer in whole or in part or to accept credit provisionally. All transfer students must satisfy the residence and course requirements for degrees sought at this University.

School-specific regulations on transfer credit follow. Any questions should be addressed to the school concerned.

Columbian College of Arts and Sciences—Applicants who have accumulated at least 30 hours (or the equivalent) of academic credit at another regionally accredited college or university may be admitted to Columbian College as transfer students with advanced standing. Applicants who have completed fewer than 30 hours of acceptable credit must meet the entrance requirements for freshmen.

Advanced standing may be awarded for properly certified courses for which the student received a grade of *C-* or above, provided that such courses are comparable to the curriculum requirements for the degree sought in Columbian College. No more than 18 credit hours of professional courses completed at another institution will be assigned toward a degree in Columbian College. In the case of course work completed at a two-year college, no more than 66 hours of credit may be applied as advanced standing toward a degree in Columbian College. Although a grade of *D* in a course is not acceptable for transfer, the course may satisfy a curriculum requirement. Credits earned with a grade of *D* will not, however, be assigned as advanced standing.

Students wishing to transfer from another division of the University into a degree program in Columbian College must submit to the Office of Admissions a formal application for transfer and must be in good academic standing with a cumulative grade-point average of 2.0 or above at the time of transfer. A maximum of 45 credit hours earned as a nondegree student in the Office of University Students may be applied toward a degree in Columbian College.

School of Business and Public Management—Students who have accumulated fewer than 30 credit hours of transferable, relevant academic credit must have a minimum 2.8 cumulative grade-point average and also meet freshman admission standards. Students who have accumulated 30 or more hours of transferable credit must have a cumulative grade-point average higher than 2.8. Advanced standing may be awarded for properly certified courses taken at regionally accredited colleges or universities for which the student received a grade of *C* or better. A maximum of 90 credit hours may be applied toward a degree, provided the credit is comparable to the curricular requirements of the degree. At least 27 credit hours in required business or accountancy courses must be completed while registered in the School of Business and Public Management. Interna-

tional students who have completed part or all of the English composition requirement must take a validation examination through the English Department to determine if English advanced standing can be applied toward partial satisfaction of their GW degree requirements.

In no case will more than 60 credit hours of advanced standing be granted for course work completed at regionally accredited community or junior colleges. Certain business courses (one course per area up to a maximum of three courses), comparable to this School's courses numbered 101–200, taken at a regionally accredited community or junior college with an earned grade of C or better, may be accepted for credit only after BAdm 197. Strategy Formulation and Implementation, is successfully completed with a grade of C or better in the senior year.

Although a grade of D is not acceptable for transfer of credit, the course may be used to waive a comparable curricular requirement. Credits earned with a D grade may not, however, be counted toward the total number of credit hours required for the degree. Any course completed with a grade of D or better may not be repeated for the purpose of earning degree credit. An exception to this rule is the freshman English composition requirement, Math 31 or 51 (or their equivalents), and all accountancy courses. Any student earning a D in such courses at another institution may be required to repeat the courses at this University.

An international student who is required to take the English as a Foreign Language placement test and fails to pass it will be required to complete successfully the appropriate English composition course or courses, and the assignment of credit for any previously completed courses at another institution will be held pending completion of this requirement.

Students wishing to transfer from another division of the University into a degree program in the School of Business and Public Management must submit to the Office of Admissions a formal application for transfer and must be in good academic standing, with a cumulative grade-point average of 2.8 or above at the time of transfer. Courses taken in another degree-granting division of this University may be applied toward a degree in this School, provided they are comparable to the curricular requirements of the degree. A maximum of 90 credit hours of such credit may be applied toward a degree program in this School. However, in no case will more than 45 credit hours of undergraduate course work taken at this University in nondegree status be allowed toward meeting degree requirements in this School. Credit for correspondence or home-study courses will not be applied toward a degree in this School.

School of Engineering and Applied Science—To be considered for admission as a transfer student, an applicant must be in good standing as to scholarship and conduct at all postsecondary institutions previously attended and should have a minimum grade-point average of 2.7 on a 4.0 scale. A student who has been academically dismissed will not normally be considered for admission.

When no duplication is involved, either through course work or examination, transfer credit may be granted for work successfully completed at other accredited institutions of higher learning prior to enrolling at GW. Credit will be granted only when such work meets the requirements for the degree sought at this University. Courses graded D+, or the equivalent, or lower will not be considered for transfer.

Although there is no strict limit to the total amount of transfer credit that may be assigned, a student must satisfy the 30-credit-hour residence requirement and course requirements for the degree sought at George Washington University. Students should complete a Transfer of Credit worksheet, available in the SEAS Office of Admissions and Student Records, and present the worksheet to the faculty advisor for approval. A limited amount of credit may be assigned for selected service school courses.

Elliott School of International Affairs—Applicants who have accumulated at least 30 credit hours (or the equivalent) of academic credit at another regionally

accredited college or university may be admitted to the Elliott School of International Affairs as transfer students with advanced standing. Applicants who have completed fewer than 30 credit hours of acceptable credit must meet entrance requirements for freshmen.

Advanced standing may be awarded for properly certified courses for which the student received a grade of C- or above, provided that such courses are comparable to the curriculum requirements for the degree sought in the Elliott School. In the case of course work completed at a two-year college, no more than 66 credit hours of credit may be applied as advanced standing toward a degree in this School.

Although a grade of D in a course is not acceptable for transfer, the course may satisfy a curriculum requirement. Credits earned with a grade of D will not, however, be assigned as advanced standing.

Students wishing to transfer from another division of the University into a degree program in the Elliott School must submit to the Office of Admissions a formal application for transfer and must be in good academic standing with a cumulative grade-point average of 2.5 or above at the time of transfer. A maximum of 45 credit hours earned as a nondegree student in the Office of University Students may be applied toward a degree in this School.

Enrollment Deposit

After notification of acceptance, an enrollment deposit will be required of all new full-time undergraduate students. This deposit is due May 1 for freshmen entering in the summer or fall semester; it is usually due two weeks after admission for transfer students. The deposit is credited toward tuition and orientation and is not refundable. Full-time readmitted students are required to submit an enrollment deposit that is usually due two weeks after admission.

Advanced Standing and Advanced Placement

Advanced Placement or Waiver by Examination

Advanced placement or waiver of a requirement will be granted on the basis of scores on the College Board SAT II subject tests as follows:

Subject Test	Minimum Score	Exemption
American history	650	Waives Hist 71-72
Writing	710	Waives Engl 10
French, Spanish	690	Waives a two-year language proficiency requirement
German, Latin	630	

Note that Columbian College's General Curriculum Requirement in foreign languages and cultures is not waived on the basis of these tests. A score of 28 or above on the ACT English Usage Test will waive English 10. Advanced standing (academic credit) is not assigned on the basis of SAT I or II or ACT results.

Credit by Examination, from Service Schools, from Noncollegiate Organizations, and by Nontraditional Methods

Assuming there is no duplication of course work, a maximum of 30 credit hours may be assigned upon admission to the University for any combination of the following except as noted below.

College Board Advanced Placement (AP) Tests—On the basis of a score report sent to the Office of Admissions from the Educational Testing Service at the student's request, undergraduate credit is assigned for scores of four or five on all Advanced Placement Tests. Test scores below four are not accepted for assignment of academic credit. The Advanced Placement Tests are administered in the secondary schools in May of each year. Normally only students who com-

plete a course designated as Advanced Placement are prepared for the examination. Students should arrange for the examination through the secondary school attended or with the College Board, Advanced Placement Tests, CN 6671, Princeton, N.J. 08541-6671.

College Board College-Level Examination Program (CLEP)—CLEP offers two types of examinations: General and Subject Examinations. CLEP General Examinations are offered in five areas: English composition, humanities, mathematics, natural sciences, and social sciences and history. CLEP Subject Examinations measure achievement in specific college-level courses and are offered in 32 subjects. Students should arrange for the examinations with the College Board, College-Level Examination Program, CN 6601, Princeton, N.J. 08541-6601.

With the exception of the English composition examination, for which no credit is given, credit is assigned for the General Examinations passed at approximately the 50th percentile or above. In the School of Business and Public Management, credit is not assigned for the mathematics examination. In the School of Engineering and Applied Science, credit is not assigned for the mathematics or natural sciences examinations.

Credit is assigned, with some exceptions, for the Subject Examinations passed at the level recommended in the College Board model policy. Credit for the CLEP Subject Examinations may not be earned by passing the examination after having taken an equivalent college-level course. See the School of Business and Public Management for specific restrictions on CLEP credit for applicants to that school.

Special Departmental Examinations for Undergraduates—Credit may be assigned for Special Departmental Examinations administered by Columbian College departments to students enrolled in all undergraduate divisions of the University.

International Baccalaureate—GW awards 6 to 8 credit hours for Higher-level scores of 5 and above with the exception of English language. Students who have passed English A1 with a grade of 6 or 7 will receive 6 credit hours for Literature; for a grade of 4 or 5, students will receive 3 credit hours. No credit will be assigned for English B or for subsidiary-level examination scores.

Credit Earned Through USAFI and DANTES—Except to students enrolled in the School of Business and Public Management, credit is assigned for approved United States Armed Forces Institute (USAFI) and Defense Activity for Non-traditional Education Support (DANTES) courses.

Credit from Service Schools—Except to undergraduates admitted to the School of Business and Public Management, a limited amount of credit may be assigned for selected service school courses.

Office of University Students

The Office of University Students makes on-campus credit courses available to nondegree, visiting students. Non-residents of the United States are required to apply to the Office of University Students. Applications can be obtained by contacting the Office of University Students at 202-994-1972 or through the website at <http://www.gwu.edu/~ous>. There is no application fee. For detailed entrance requirements, see the section on the Office of University Students under Other Programs and Services in this Bulletin.

FEES AND FINANCIAL REGULATIONS

Fees paid by students cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution makes up the difference.

The following fees and financial regulations were adopted for the academic year 2002-03. Information on tuition and fees for the summer is published in the Summer Sessions Announcement.

Tuition Fees

For full-time undergraduate study* during the academic year 2002-03 in Columbian College of Arts and Sciences (excluding its School of Media and Public Affairs), the School of Business and Public Management, the School of Engineering and Applied Science, and the Elliott School of International Affairs: new students and continuing students who entered GW in fall 2001 or later, \$27,790; continuing students who entered prior to fall 2001, \$27,430. Part-time and nondegree students are charged at the rate of \$877.50 per credit hour (excluding SMPA programs). For students with a declared major or minor in the School of Media and Public Affairs: new and continuing students who entered GW in fall 2001 or later, \$28,790 for majors and \$28,290 for minors; prior to fall 2001, \$28,430 for majors and \$27,930 for minors; the per-credit rate for part-time students enrolled in SMPA programs is \$907.50.

Voluntary Library Fee—The Registration Schedule and Invoice includes a voluntary gift for the University libraries. Check the box labeled "Library Gift Decline" and omit the amount from your payment if you do not wish to include the library gift in your reimbursement to the University.

Note: Information on the fee structure for campus housing and meal plans appears on page 35. Some courses carry additional fees, such as a laboratory or material fee, charged by semester as indicated in course descriptions and the Schedule of Classes. Students admitted to the Seven-Year Integrated B.A./M.D. program pay a fixed net tuition rate annually; the amount is announced in the letter of admission.

Special Fees and Deposits (Nonrefundable)

Application fee (all degree candidates)	\$60
Advance deposit, required of each entering or readmitted full-time undergraduate	800
Orientation fee, charged each entering full-time undergraduate	250
Student Association fee, per credit hour, to a maximum of \$15 per semester	1
Late registration beginning the first week of the semester	80
Registration for continuous enrollment or leave of absence	35
Graduation fee	100
Late-payment fee (see Payment of Fees, below)	75
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for any reason	25
Special Columbian College departmental examination to qualify for receiving credit (advanced standing), waiver of requirement, or both	100
Waiver examination to qualify for advanced placement	25
Engineers' Council fee (charged all SEAS students), per semester	8

*A full-time program is defined as 12-17 credit hours per semester; a part-time program is fewer than 12 credits per semester. Undergraduates taking more than 17 credits per semester will be charged at the rate of 1 credit hour for each credit exceeding that limit. Undergraduates in the School of Engineering and Applied Science who are required to take 18 or 19 credits in some semesters will not be charged for the eighteenth and nineteenth credits.

English test for international students (when required)	20
Study abroad fee	150
Transcript fee	5
Replacement of lost or stolen picture identification card	25
Replacement of diploma	50

Payment of Fees

A student who registers for classes in any semester or session incurs a financial obligation to the University. Payment of tuition and fees, as detailed on the Schedule and Invoice, is due approximately two weeks prior to the first day of classes. Changes to registration that affect charges to the student's account must be recorded through the Office of the Registrar.

In addition to payment of tuition and fees, the University requires that a student confirm his or her registration. Students whose registrations are not confirmed by the third week of the semester may be canceled from all courses. Receipt of the tear-off portion of the Schedule and Invoice, typically mailed with the student's payment, is requested for confirmation of registration. All students whose registrations are not confirmed are notified in writing that their registrations will be canceled and are asked to contact the Student Accounts Office immediately.

Charges for residence halls and meal plans are in accordance with lease agreements signed by the student. Questions concerning those charges should be referred to the Community Living and Learning Center or Auxiliary and Institutional Services, respectively.

The University offers several options for payment of tuition and fees in addition to payment in full upon receipt of the Schedule and Invoice or at the time of registration.

Deferred Payment Plan—Any student registered for 6 or more credit hours may be eligible to participate in this plan. Advance arrangements are not required. Students who receive GW employee tuition benefits or departmental tuition awards are not eligible to participate in this plan unless the student's balance after awards are deducted is greater than \$3,000. An eligible student may use the deferred payment plan by paying the minimum amount due for the semester as specified. The remaining balance plus accrued interest is due by the eighth week of classes. Interest on unpaid balances is charged at the rate of 12% per annum beginning the first day of classes each semester. If payment in full is not received by the end of the eighth week of the semester, interest will continue to accrue at the rate previously stated and the account will be assessed a \$75 late payment fee.

Monthly Payment Plan—This University payment plan is open to all students and is available for the fall and spring semesters only. Students must complete and submit an application by August 15 for the academic year or by January 5 for the spring semester to participate in the plan. Upon approval of the application, the University will furnish coupons and return address labels for each payment. The monthly payment plan for the academic year begins in June and ends in March, with the first five payments applied to the fall account and the second five applied to spring. For spring semester only, the plan begins in November and ends in March. Under the plan, all payments are due on the first of each month. The student will receive a monthly bill, but no interest or late fees will be charged provided payments are received as scheduled. Students who enroll in the plan after the first month must make up all payments to the month of enrollment. Interest and a \$75 late payment fee are assessed all accounts not paid in full by October 1 for fall and March 1 for spring.

Third-Party Billing—The University accepts employer vouchers or purchase orders that are not contingent upon receipt of grades. Under all circumstances,

however, the charges for tuition and fees remain the responsibility of the student. Should a sponsor fail to remit payment to the University, the University will contact the student for payment. A student whose employer or sponsor reimburses him or her for tuition and fees after receipt of grades must pay in full by the stated due date to avoid interest, late fees, and/or cancellation of registration. Students whose tuition is paid in full or part by employee benefits or teacher tuition remission must pay any remaining balance by the stated due date to avoid interest, late fees, and/or cancellation of registration.

Accounts that are past due are encumbered by the University. A student whose account is encumbered may not register for future semesters and may not receive diplomas or transcripts. Accounts that are more than 90 days past due are referred to an agency for collection. The student is then responsible for all charges due the University as well as all collection costs incurred by the agency.

A student whose check is returned unpaid by the bank for any reason will be charged a returned check fee.

Withdrawals and Refunds

Applications for withdrawal from the University or from a course after the registration period must be made in writing to the dean of the school or division and to the registrar. Notification to an instructor is not an acceptable notice (see Withdrawal under University Regulations). Financial aid recipients must notify the Office of Student Financial Assistance in writing. No refund of the tuition deposit required of entering students is granted.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. **Complete withdrawal from all courses (on-campus students):**

Withdrawal dated on or before the end of the first week of the semester	80%
Withdrawal dated on or before the end of the second week of the semester ...	60%
Withdrawal dated on or before the end of the third week of the semester	40%
Withdrawal dated on or before the end of the fourth week of the semester	25%
Withdrawal dated after the fourth week of the semester	None
2. **Partial withdrawal:** If the change in program results in a lower tuition charge, the refund schedule above applies to the difference.
3. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.
4. **Summer Sessions:** In cases of authorized withdrawals from courses, refunds of 75% of tuition and fees will be made for courses dropped within the first seven calendar days of the start of a session. No refund will be made for courses dropped thereafter.

The above information regarding cancellation of tuition charges and fees after withdrawal from the University may not apply to entering students who are recipients of federal aid; those students should check with the Student Accounts Office for the applicable cancellation schedule.

Refund policies of the University are in conformity with guidelines for refunds as adopted by the American Council on Education. Federal regulations require that financial aid recipients use such refunds to repay financial aid received for that semester's attendance. This policy applies to institutional aid as well.

In no case will tuition be reduced or refunded because of absence from classes.

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

FINANCIAL AID

The George Washington University offers a program of financial assistance for students. Undergraduate aid consists of two basic types: awards for academic achievement or talent without reference to financial circumstances (merit scholarships) and scholarships, grants, loans, and employment based on both academic achievement and demonstrated financial need. All undergraduate gift aid (institutional scholarships and grants and federal grants) requires that the recipient be working on the first undergraduate degree and be registered for a full-time course load on campus at GW. (Financial aid for study abroad is limited and depends on the type of program attended; applicants must attend a session on financial aid for study abroad.) Loans and resident assistantships not based on financial need are available. In general, continuation of undergraduate aid does not extend beyond eight semesters, or the end of the senior year, or the number of credits sufficient to graduate, whichever comes first.

Gift aid (scholarships, grants, fellowships, assistantships, etc.) is taxable to the extent that it exceeds the allowable costs of tuition, fees, and required books and supplies or is dedicated to other costs, such as room and board. Federal grants may be taxable if, together with other gift assistance, they exceed the allowable costs. In the case of a student who is awarded tuition scholarships, grants, or awards from more than one source, the combined amount cannot exceed tuition charges; institutional aid will be adjusted to this limit.

In general, consideration for financial aid is restricted to students in good academic standing who meet the minimum grade-point average for particular awards and are not financially encumbered by any other University office. Awards may be rescinded if satisfactory academic progress standards are not met. Applications for institutional or federal aid cannot be processed if the relevant tax returns have not been filed in accordance with the IRS Code. The University reserves the right to ask for documentation necessary to determine aid eligibility. Documents submitted as part of aid applications become the property of the University and cannot be returned. Federal regulations require that the University report suspected cases of fraud or misrepresentation to the appropriate federal, state, and local authorities.

Information in this section is accurate at the time this Bulletin is prepared for press. Additional information is contained in the Financial Aid Sourcebook and the Satisfactory Academic Progress brochure available from the Office of Student Financial Assistance. Future changes in federal regulations or institutional policies may alter the application requirements or program guidelines.

Merit Aid

The University has merit aid programs of scholarships and awards for students with superior academic credentials or talents. These programs are based entirely on merit, without regard to financial need. Renewal is dependent on satisfactory academic progress relevant to the specific award in at least 15 credit hours per semester, as stated on the back of the award letter. Merit scholarships, including GW-sponsored National Merit Awards, cannot be combined.

Presidential Academic Scholarships—for incoming freshmen. Partial tuition scholarships are awarded to finalists in national academic competitions such as National Merit, National Hispanic Scholars, and National Achievement for Outstanding Negro Students. Partial tuition awards are also available to other outstanding students, including students admitted to the University Honors Program and Presidential Science Scholars in Chemistry and Physics. Members of Phi Theta Kappa or Alpha Beta Gamma who are transferring from community or junior colleges and have achieved grade-point averages of 3.7 and above in 56 transferrable hours will be considered for partial tuition awards. A GPA of 2.7 (B-) on 15 earned credits per semester, exclusive of courses not counted

toward graduation, is required for renewal of Presidential Academic Scholarships awarded prior to fall 1999. A GPA of 3.0 (B) on 15 earned credits per semester, exclusive of courses not counted toward graduation, is required for renewal of these scholarships awarded for fall 1999 and thereafter. Renewal of the Honors Program Award is determined by the program director; questions should be addressed to the University Honors Program.

Merit scholarships are also available to students admitted to the seven-year integrated B.A./M.D. and the SEAS/M.D. program; offering a unique fixed-tuition plan, this arrangement allows families to plan and finance their student's undergraduate and medical education. These integrated programs require a GPA of 3.0 for renewal.

Presidential Arts Award—partial tuition awards for incoming freshmen who have shown promise in the fine arts and in music, theatre, or dance. A GPA of 3.0 (B) and the recommendation of the relevant department is required for renewal.

Presidential Scholarships—partial tuition awards in the amount of \$10,000 (limit of \$5,000 per semester) are available to continuing students who have completed two consecutive semesters at GW with a GPA of 3.6 on a minimum of 15 earned credit hours each semester and who have at least a cumulative GPA of 3.6. Students are reviewed for this scholarship once a year in May. Students who are already receiving merit aid from the University are ineligible for this award.

Awards for Phi Beta Kappa—\$2,000 awards for the senior year are made to students who are elected to Phi Beta Kappa in their junior year and who are not receiving another merit scholarship.

Elliott Engineering Honor Scholarships—\$10,000 awards are offered to outstanding incoming SEAS students with 30 or more transferable credit hours and a minimum of 3 credits of college-level chemistry or physics and 6 credits of college-level calculus or higher math. Awards may be renewed by current recipients who maintain the required GPA of 3.0 in 15 credits per semester, provided the recipient is enrolled full time in an engineering curriculum.

The J.B. and Maurice C. Shapiro Scholarship to the University of Oxford is awarded each spring to a graduating senior or recent graduate through a competitive process upon the nominee's acceptance to Oxford. To be eligible, applicants must have applied for the Rhodes or British Marshall Scholarships. All of these competitions require high academic standing, evidence of leadership, and dedication to the larger society through community service. The Shapiro Scholarship provides up to two years of study at Oxford, equivalent to the Rhodes Scholarship. The J.B. and Maurice C. Shapiro Endowment funds two scholarships per year—one new and one renewal. The Shapiro Scholarship program began in 1992.

The Bender Scholarship to the University of Cambridge is funded by an endowment, the Bender Scholarship Fund. Every other year, the Bender Scholarship is open for competition. Graduating seniors, recent graduates, and third-year law students who participated in the Rhodes and/or British Marshall competitions are eligible for the Bender Scholarship. The endowed scholarship provides for up to two years of study at the University of Cambridge. The award provides for an educational experience equivalent to that of a British Marshall Scholar attending Cambridge. The Bender Scholarship criteria are high academic achievement, evidence of leadership skills or potential, and community service. The first GW Bender Scholar attended Cambridge in 1992.

Pembroke/GW Program—The George Washington University established a special relationship with Pembroke College in Oxford, whereby up to six GW juniors would be placed at the College for one year and enrolled as fully matriculated students of the University of Oxford. These placements are determined in an annual competition that takes place in the fall. The Committee evaluating candidates forwards to Pembroke College applications of the final-

ists. Pembroke then makes the final decision on placements. As of spring 2001, 22 GW students have spent a year at Oxford in this program, with more entering in the 2001-02 academic year.

Need-Based Aid

The University offers extensive programs of scholarships, grants, loans, and employment based upon demonstrated need. The University participates in the Federal Perkins Loan, Federal Pell Grant, Federal Supplemental Educational Opportunity Grant, Federal Family Education Loans, and the Federal Work-Study program. All applicants are required to file both the PROFILE and the Free Application for Federal Student Aid (FAFSA), designating GW to receive their information, and to supply copies of signed federal income tax returns and W2 forms for the current tax year for student and parents (if dependent). For family members employed by an international organization, a letter is required from the employer certifying salary and all benefits. Continuing students also need to submit a **GW Financial Aid Application**.

Incoming freshmen must file applications and supporting credentials for financial aid by January 31 for the next academic year; transfer students, by April 1. Continuing students must file the PROFILE and FAFSA forms by April 15, and submit the GW Financial Aid Application for Continuing Undergraduate Students and supporting tax documents to the Office of Student Financial Assistance no later than April 17. March 1 is the deadline for the summer sessions. Summer aid is limited to federal or alternative loans. A student must reapply each year for all need-based aid, including need-based scholarships; renewal is contingent upon funds being available when the student completes the application.

University Scholarships

Full and partial tuition scholarships begin in the fall semester and may be renewed through the senior year, provided the holder reapplies by the published deadlines, maintains a B- average or better, completes 15 credits per semester, and continues to demonstrate financial need. All applicants for need-based aid are considered for these awards.

Sherman Page Allen Memorial Scholarship Fund
American Association of Cost Engineers Scholarship
Mary J. Anderson Scholarship
Byron Andrews Scholarship
D.F. and J.D. Antonelli Scholarship Fund
Athletic Scholarship Fund
Atlantic Research Corporation Scholarship
Stanley M. Baer Scholarship in Electrical Engineering
Sigrid Weeks Benson Scholarship
Board of Trustees Scholarship
Gail E. Boggs Engineering Scholarship
Bou Family Foundation Scholarship
Henry N. Brawner, Jr., Foundation Scholarship Fund
A.D. Britt Scholarship Fund
Frederick Albert and Alma Hand Britten Scholarships
Barbara Willmarth Callahan Scholarship Fund
Mary Ellen Caplin Scholarship
Elsie M. Carper Undergraduate Scholarship Fund
Emma K. Carr Scholarships
Henry Harding Carter Scholarship
Maria M. Carter Scholarship
Paul E. Casassa Memorial Foundation Scholarship

James Edward Miller Chapman Educational Foundation Scholarship
Columbian Women Scholarship Funds
 Victoria Briggs Scholarship Fund
 Elizabeth V. Brown Scholarship Fund
 Grace Ross Chamberlin Scholarship Fund
 College Women's Scholarship Fund
 Columbian Women Members' Scholarship Fund
 Arline Hughes Dufour Scholarship Fund
 Dr. Watson W. Eldridge, Jr., and John F. Eldridge Scholarship Fund
 Founders of Columbian Women Scholarship Fund
 Ross Lees Hardy Foundation Scholarship Fund
 Lillian Young Herron Scholarship Fund
 Nellie Maynard Knapp Scholarship Fund
 Marcia B. Kraft Scholarship Fund
 Janet McWilliams Scholarship Fund
 Marie-Louise Ralph Turner Scholarship Fund
Cora and John H. Davis Scholarship
Isaac Davis Scholarship
Bertha B. Day Scholarship in Civil Engineering
District of Columbia Daughters of the American Revolution Scholarship
District of Columbia Institute of Certified Public Accountants Scholarship in
 Accounting
Estella Constance Drane Scholarship
Henry Parsons Erwin Scholarship
Robert Farnham Scholarship
Federal Government Accountants Association—Washington, D.C., Chapter—
 Scholarship in Accounting
Esther Brigham Fisher Scholarship
Dean James Harold Fox Scholarship
Geico Achievement Award
Louis E. Giles Memorial Scholarships
GW Tennis Alumni Association Scholarship
Gary C. and Leslie Granoff Scholarship Fund
Mildred Green Memorial Scholarship Fund
Gridiron Foundation of the Gridiron Club Scholarship
Isadore and Bertha Gudelsky Family Scholarship
Anna Spicker Hampel Scholarship
Theo Campbell Hartman Scholarship
Elma Lewis Harvey Scholarship
Hazelton Scholarship
Adele Melbourne Holmes Native American Scholarship
George Hyman Construction Company Scholarships
Albert A. and Esther C. Jones Scholarship Fund
Allen M. Jones Scholarship Fund
David B. and James L. Karrick, Jr., Scholarship Fund
Samuel and Elizabeth Kay Scholarships
Amos Kendall Scholarship
L. Poe Leggette Memorial Scholarship Established by WRGW
Thaddeus A. and Mary Jean Lindner Scholarship Fund
Calvin D. Linton Endowment Scholarship Fund
Mary and Daniel Loughran Scholarship
Martha's Marathon Residence Hall Scholarship
Marshall Memorial Scholarship Fund
Maud E. McPherson Scholarship
Mensh Family Scholarship
A. Morehouse Scholarship

E. K. Morris Education Fund Scholarships
Lee Nowak Scholarship Fund
Helen Marie and Thomas E. Orr Scholarships
Henry and Caroline Orth Scholarship Fund
Thornton Owen Scholarship
Pan-Dodecanesian Association of America Scholarship
Hardy Pearce Scholarship Fund
James and Theodore Pedas Scholarship
Phi Delta Gamma Scholarships
Fred B. and Alma D. Pletcher Scholarship Fund
Levin M. Powell Scholarships
Jack B. Sacks Foundation, Inc., Scholarship
Henry Whitefield Samson Scholarship Fund
Scottish Rite of Freemasonry Scholarship Fund
Cecelia M. Sehrt Scholarship Fund
Sejong Scholarship Fund
Lula M. Shepard Scholarships
Mildred Shott Scholarship Fund
Sigma Delta Chi Foundation of Washington, D.C., Scholarships
Myrna Sislen Guitar Scholarship
Margaret Lucille Snoddy Scholarship
David Spencer Scholarship
George Steiner Scholarship in Music
Mary Lowell Stone Scholarship
Charles Clinton Swisher Scholarships
21st Century D.C. Scholars Program
U.S. Office of Education Traineeships
University Award for Phi Beta Kappa
University Players Scholarship in Memory of L. Poe Leggette
William Walker Scholarship
The Washington Post/Eastern High School Incentive Scholarship Program
Wanda Webb Memorial Scholarship
Abigail Ann Brown and Henry Kirk White Scholarship Fund
John Withington Scholarship
Women's Physical Education Alumnae Association Scholarship
William G. Woodford Scholarship
Ellen Woodhull Scholarship
Zonta Club Scholarship
Barbara Jackman Zuckert Scholarship Fund for Blind Part-Time Students

Other Academic Awards and Grants

Fannie Mae/H.D. Woodson High School Grant
George Washington University Tuition Grant
GW Partners in Academic Leadership Tuition Grants
GW Residence Hall Award
Marriott Foundation Grant

Activity Awards

Students who participate in cheerleading, debate, or the Pep Band will be considered for activity awards during the semesters they are actively involved. Additional information and eligibility requirements can be obtained from the directors of the programs.

Cheerleading Award

George F. Henigan Award in Debate
Pep Band Award

GW Family Tuition Grant

Families with two or more dependent children simultaneously enrolled as full-time undergraduates in a first-time degree program at The George Washington University can apply for the GW Family Grant for the younger sibling(s). This is a half-tuition grant that can be awarded for the full academic year or for the fall or spring semester only and requires that all students being considered are charged the full tuition flat rate for their program. The grant is contingent on the recipient's and his or her sibling(s)' maintaining a 2.0 grade-point average and reapplying by the deadline. Contact the Office of Student Financial Assistance for an application, which includes submission of a copy of the parents' federal tax return as verification of the dependent status of the students. International students must provide certification that they are dependent siblings either from their parents' employer (if an embassy or international organization such as the World Bank or International Monetary Fund) or from GW's International Services Office. The deadline is July 1 preceding the academic year; applications received after the deadline are awarded on a funds-available basis.

Community Facilitators

Available to juniors and seniors in any field of study who are interested in working in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes salary and a furnished room for the academic year. All positions are part time, and staff members are required to enroll as full-time students in degree programs. Further information may be obtained from the Community Living and Learning Center.

Loan Funds

Federal Stafford Loans—George Washington University is an eligible participant in the Federal Stafford Loan Program. This is a variable interest rate loan currently capped at 8.25%; repayment is up to 10 years. Eligible students may apply for up to \$2,625 as freshmen, \$3,500 as sophomores, and \$5,500 as juniors and seniors. For students who receive Subsidized Stafford funds as part of their need-based financial aid award, the government pays the interest while they are enrolled in school at least half-time and for six months afterward. Students ineligible, or only partly eligible, for subsidized funds may apply for an Unsubsidized Stafford Loan up to the same limits to cover their family contribution. Terms and conditions are the same, except that the student borrower is responsible for all interest that accrues on the unsubsidized loan from the date it is disbursed; deferments are available. Independent students (and students whose parents are denied a PLUS loan) are eligible to borrow additional Unsubsidized Stafford funds of \$4,000 as freshmen and sophomores and \$5,000 as juniors and seniors.

Federal Parent Loan for Undergraduate Students (PLUS)—George Washington University also participates in the PLUS program. This is a government-sponsored loan that can be used to supplement the student's Federal Stafford Loan or to help with the family contribution. It is a credit-based, variable-rate loan currently capped at 9% for first-time borrowers. Each academic year, parents without an adverse credit history may apply for a PLUS loan up to the cost of education, minus financial aid, for each dependent child attending college at least half-time. Loan repayment begins within 60 days of the last disbursement and the maximum repayment term is 10 years.

Please note that Federal Stafford (Subsidized and Unsubsidized) and Federal PLUS loans are made by lenders, including banks, credit unions, and savings and loan associations. The loans are insured by a guaranty agency and reinsured by the federal government; origination fees are deducted from loan proceeds

prior to disbursement. Families who intend to use loan funds for payment of University charges at time of registration should submit a loan application and all supporting documents to the Office of Student Financial Assistance no later than May 1 for the fall semester, October 1 for the spring semester, or March 1 for summer sessions.

Note that federal statute requires multiple disbursements of Stafford and PLUS loans. Recipients of one-semester-only loans, however, receive the loan proceeds in a single disbursement. Federal regulations require loan proration if the student's last loan period is less than a full academic year. Students may not borrow against or take out an emergency loan on their next semester's loan disbursement until the first day of classes of that term.

The George Washington University Plan—In partnership with our preferred lenders, the GW Plan is a loan that offers attractive interest rates. Students and/or families should compare the Stafford, PLUS, and this program to determine which offers the best interest rate and payment options that fit into the family budget. The plan allows you to obtain up to 100% of GW's annual undergraduate cost of attendance less any current financial assistance.

Other Loan Funds—The following loan funds are available to degree students. Complete information regarding each loan is available from the Office of Student Financial Assistance, Fiscal Section.

George F. Henigan Loan Fund
International Student Loan Fund
Joanne Jacobs Student Loan Fund
Jessie B. Martin Loan Fund
Jack and Anne Morton Loan Fund
Barney Plotnick, M.D., Student Loan Fund
Hiram Miller Stout Memorial Loan Fund
University Student Emergency Loan Fund
Edmund W. Dreyfuss Loan Fund
Peter and Doris Firsht Loan Fund

In addition, the Inner-City Special Student Assistance Loan Fund is available through the GW Multicultural Student Services Center.

Student Employment

The University participates in the Federal Work-Study Program. Inquiries should be addressed to the Office of Student Financial Assistance. Work-study job placement is handled by the Career Center. In addition, the Career Center maintains a registry of both full-time and part-time positions available in the Washington area for undergraduate and graduate students. After registration, students may apply at the Career Center for interviews and referrals to positions for which they are qualified.

International Students

Undergraduate international students with proven financial need who have completed two semesters of full-time work (30 credit hours) at this University with a C average are eligible to apply for University and Alumni Awards. Aid is awarded in the spring for the following academic year. See instructions for applying for undergraduate financial aid, above. For those not filing a U.S. tax return, a letter from the employer, certifying salary and benefits, is required.

The maximum award for an international student is \$10,000 including any merit scholarship offered at the time of admission.

Students who wish to study in the United States should have sufficient funds available to cover expenses for one full year before attempting to enter a college or university. The cost at this University for one academic year (September-May) was \$37,293 in 2001-2002 and will be higher in 2002-2003; generally speaking,

expenses for international students are about \$2,000 over the stated figure, which includes room and board, tuition, books, clothes, and incidental expenses, but not travel, holiday, or medical expenses.

Veterans Benefits

The Veterans Benefits office assists students entitled to educational benefits as active-duty personnel, veterans, or as widows or children of deceased or totally disabled veterans with any problems that may arise concerning their benefits. This office also processes certification of enrollment and attendance to the Veterans Administration so that educational allowances will be paid.

When feasible, students entitled to benefits as active-duty personnel, veterans, or dependents of veterans should consult with the veterans counselor prior to submitting applications to the Veterans Administration. All such students should obtain the instruction sheet issued by the veterans counselor; it sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration and includes other information of general interest. Eligible students should be aware they must be admitted to a degree seeking program by the start of their third semester in order to continue receiving veterans benefits.

STUDENT SERVICES

Office of the Dean of Students

The Office of the Dean of Students provides counseling and information for students, administers the nonacademic student disciplinary system and student grievance procedures, assists students in resolving complex issues, and supports nonacademic program development. Staff members are well informed on University policies and the various student services provided on campus, enabling them to provide referrals and answers to many questions concerning general student life. Personal letters of recommendation for students applying to graduate and professional schools can be obtained from this office. The Office of the Dean of Students oversees the Community Living and Learning Center.

Campus Housing

Complete information concerning the University's residence halls is available from the GW Community Living and Learning Center (CLLC). Its website address is <http://gwired.gwu.edu/cllc>. CLLC offers safe residence hall facilities and a diverse range of community living environments and co-curricular initiatives designed to promote student growth and development. Among the offices and services contained within CLLC are the areas of Freshmen Services, Housing Services, Student Judicial Services, and Summer Housing Services.

Admission to the University does not include a room reservation. The student will receive, with the notification of acceptance, University residence hall information, an application for residence hall space or apartment accommodation, and a declaration of intent to attend the University.

Rooms and apartments are available for the academic year, with assignments on a first-come, first-served basis. License agreement payment must be made in late July for the fall semester, unless the student elects the 10-month payment

plan. Please check with Student Accounts for details regarding the 10-month payment plan.

Charges for residence hall space are determined by hall, room size, and amenities, with the 2001-02 most prevalent cost set at \$6,130 for the academic year. In the apartment halls the 2001-02 most prevalent charge per student is set at \$7,160 for the academic year, with prices ranging higher and lower according to the space and amenities provided. Exact costs for the 2002-2003 academic year will be announced.

GW Dining Services

Freshmen, sophomores, and juniors residing in on-campus housing are required to select a meal plan. All students may choose from a number of meal plans that are newly structured to offer convenience and flexibility. At a later date, meal plan prices for the 2002-03 academic year will be published by GW Dining Services. For planning purposes, freshmen should budget \$2,700 to \$3,200 for the academic year.

Student Health Service

The Student Health Service is an outpatient clinic staffed by physicians, nurse practitioners, and physician assistants who can evaluate and treat most of students' medical problems. Visits should be arranged by appointment; urgent problems may be seen on a walk-in basis if necessary. Charges for visits, lab-work, and medication apply. Psychiatric evaluation and short-term therapy appointments and crisis intervention are available. Health education and outreach programs on a variety of topics are provided throughout the year.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. All fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. Students enrolled in off-campus programs and continuing education programs are not eligible. Bills incurred both in and outside of the Student Health Service (for example, x-ray work, laboratory work, and office visits to private physicians) are the responsibility of the student. Additional information about the Student Health Service can be found at <http://gwired.gwu.edu/shs>.

Health and Accident Insurance

The University recommends that all students be covered by health and accident insurance. For information on health insurance offered through the University, students should contact the Chickering Group at 1-800-213-0579.

Immunization Requirements

The District of Columbia Immunization Law requires that all students under the age of 26 have a record on file with the Student Health Service documenting a current tetanus/diphtheria booster (within 10 years prior to initial registration) and two doses of vaccine against measles, mumps, and rubella that were given after the first birthday. The Health Service recommends that students be immunized against hepatitis B and varicella and that residence hall students be immunized against meningitis. The Health Service can give any needed inoculations on a fee-for-service basis. Students who have not provided proof of necessary immunization by the end of the second week of classes may be removed from classes until such proof is given and will be encumbered by the Student Health Service and will not be able to register for the next semester until such proof is given.

University Counseling Center

University Counseling Center services help students resolve personal, social, career, and study problems that can interfere with their academic progress and success. Services include workshops and groups on topics such as time management, study skills, procrastination prevention, family and relationship issues, choosing a career, stress management, conflict management, and self-esteem/self-development; and clinical services, including crisis intervention and brief personal counseling for issues related to college life. The Center offers consultation and training programs for student, faculty, and staff groups. Career counseling and referral services are available to GW students, faculty, staff, alumni, and individuals from the greater Washington community. The Center provides self-help pamphlets, books, and tapes through its personal development program. Students can apply for tutors through the Peer Tutoring Service, which is coordinated by the Center. The Peer Tutoring Service matches tutors with students requesting assistance for specific academic courses. All student tutors are selected by the faculty and trained by the Center. Further information about all services and links to other psychoeducational materials can be obtained by visiting the Center's website at <http://gwired.gwu.edu/counsel>.

Career Center

The Career Center promotes effective career planning, teaches job search strategies, and facilitates contacts between GW students, alumni, and prospective employers through its many services. Services include full- and part-time job listings; internship listings; career consulting; workshops (including job search strategies, letters and resumes, and effective interviewing); the career resource room; on-campus recruiting; resume referral; resume critiques; the work-study program; cooperative education; computer- and Internet-based job resources; and a credentials service that supports graduate/professional school applications. Further information on the Career Center is at <http://gwired.gwu.edu/career>.

International Services Office

The International Services Office provides services to GW's international students, scholars, faculty, and staff. The office provides advising on a variety of personal issues, including cultural adjustment, living conditions, academic concerns, and finances; provides immigration assistance and information on U.S. government requirements and regulations specific to the international community; conducts orientation programs to assist in living, studying, and working in the United States; and serves as a resource center for the University community on issues of cross-cultural understanding.

Disability Support Services

Disability Support Services provides and coordinates support services for students with a wide variety of disabilities, as well as those temporarily disabled by injury or illness. Accommodations are available through DSS to facilitate academic access for students with disabilities. Services provided without charge to the student may include orientation to campus, registration assistance, readers, interpreters, scribes, learning disabilities advising, adaptive materials and equipment, assistance with note taking, laboratory assistance, test accommodations, regular advising, and referrals. DSS does not provide content tutoring, although it is available on a fee basis from other campus resources. The University does not pay for personal attendant care. DSS is located on the 2nd floor of the Marvin Center and is open from 9 a.m. to 5 p.m. weekdays and at other times by appointment.

Multicultural Student Services Center

The Multicultural Student Services Center provides academic, co-curricular, and personal support services for all GW minority students to enhance minority student life at GW. Through the Center, minority students receive orientation to the various University resources, and are made aware of the many cultural activities and programs that exist on campus and in the greater metropolitan area. The Center provides professional and peer counseling, course advising, tutorial referrals, and campus and community mentoring programs. The staff is available to address students' academic and personal concerns.

The Multicultural Student Services Center also provides a wide range of services, educational programming, and social and cultural activities to enhance the multicultural ideals or cultural heritage, racial understanding, academic excellence, and continuous personal development for all students. The Center oversees the Diversity Program Clearinghouse, which supports various programs designed to educate the campus in areas of cultural diversity and socioeconomic issues. The Center houses a resource center with reference books and instructional materials, and coordinates various preparatory and precollege programs.

High School/College Internship Program—The Multicultural Student Services Center oversees the High School/College Internship Program (HI/SCIP), which enrolls highly motivated District of Columbia high school seniors. Participants enroll at GW as nondegree candidates, taking a maximum of 6 credit hours per semester in addition to their high school curriculum. Application to the HI/SCIP program is made through the student's high school guidance office, and decisions are made by the Office of Admissions.

Student Activities Center

The Student Activities Center furthers the educational mission of the University by offering programs, services, and facilities that foster the social and cultural development and school spirit of members of the University community. Staff members assist individual students and campus organizations with event planning, program coordination, and participation in special projects.

Programs and activities include advisement of campus organizations, registration of student organizations, planning and coordination of major campus events, and oversight of Greek Affairs, Colonial Inauguration, the Presidential Administrative Fellows Program, band and cheerleading, and intramural and club sports. Additional information about the services offered by the Student Activities Center, and about the various student organizations and committees, can be obtained from the *Student Planner and Handbook*.

Program Board—The Program Board, composed chiefly of elected and appointed students, has the primary responsibility of allocating resources for student programming on campus. In addition, the Program Board provides funding for activities presented by various campus organizations and encourages student participation in program planning through involvement in committees on the arts, concerts, festivals, films, parties, political affairs, and public relations.

Student Government—The George Washington University Student Association is made up of all full-time and part-time undergraduate and graduate students who are registered for academic credit on campus. A body of elected and appointed individuals is responsible for representing the interests of students at the University. The Student Association provides various services for students, such as academic evaluations, test and syllabus files, and the Student Advocate Service.

Student involvement in the governance of the University is also possible through participation in various administrative and Faculty Senate committees, advisory councils of the schools and college, selected committees of the Board

of Trustees, and specialized bodies, such as the Residence Hall Association, the Joint Food Services Board, and the Marvin Center Governing Board. This involvement has helped develop policies and programs beneficial to students and to the University community as a whole.

Student Organizations—Students are encouraged to become involved with existing student organizations or to initiate their own. There are approximately 270 registered organizations on campus, covering a broad spectrum of interests, including academic, professional, international, cultural, political, service, sports, hobbies, recreational, religious, and meditative groups as well as social fraternities and sororities.

The Cloyd Heck Marvin Center

The Marvin Center is the GW campus community center. The Marvin Center offers programs, services, and facilities for students, faculty, staff, alumni, and University guests. The Center's wide range of facilities includes dining locations, a theatre, lounges, recreational facilities, study rooms, conference and meeting rooms, Information Center, Colonnade Gallery, travel agency, computer store, bookstore, and Student Organization Resource Center.

The Marvin Center provides facilities for programs conducted by the University Program Board, by academic departments that include the performing arts, and by other University organizations. The operation of the Marvin Center is overseen by Student and Academic Support Services.

The Marvin Center Governing Board is a representative body composed of students, faculty, staff, and alumni. The Board works closely with the Center's staff in the review and development of policies, guidelines, and procedures that direct the operation of the Center.

Religious Life

The University recognizes the contribution that religion makes to the life of its students and encourages them to participate in the religious organizations of their own choice. Several religious bodies sponsor various groups and form a link between the University and the religious community. The advisors of the religious organizations are available for counseling and together constitute the Board of Chaplains to enhance religious life on campus. Religious services and special observances are also provided for the University community as announced.

Major Program Events

Art Exhibits—The work of locally, nationally, and internationally known artists is shown in monthly exhibits in the Dimock Gallery in Lisner Auditorium and in the Colonnade art gallery of the Marvin Center. Student art exhibits are presented each semester.

Concert Series—The Department of Music presents a series of concerts featuring faculty, guest, and student artists throughout each year. Other concerts are held regularly in the Marvin Center, Lisner Auditorium, and the Smith Center.

Dance—The Department of Theatre and Dance presents major dance concerts, informal studio performances, experimental events, television appearances, and lecture-demonstrations. Students may audition to participate and have the opportunity to choreograph, perform, and gain experience in the technical aspects of dance productions.

Glee Club, Jazz Band, and Orchestra—The University Singers, University Band, Jazz Band, and Orchestra are available to students either as credit courses or as cocurricular activities. All of these organizations present major perfor-

mances to the University community several times a year, including regular winter and spring concerts. Chamber groups and jazz combos are regularly available for participation by all students.

Program Board—The University Program Board, through its various committees and in cooperation with other campus groups, regularly sponsors films, lectures, concerts, social activities, and special events.

Theatre—The Department of Theatre and Dance produces four major plays and musicals during the year on the proscenium/thrust stage in the Dorothy Betts Marvin Theatre. Additional works, including original and experimental plays, are produced in a more intimate studio theatre. Students can participate in all aspects of theatre and may receive credit toward their B.A. or M.F.A. degrees for some of their production work.

Athletics, Recreation, and Intramurals

The Charles E. Smith Center offers many facilities for student use, including courts for basketball, volleyball, and badminton; a jogging track; a swimming pool; gymnastics and weight rooms; racquetball and squash courts; and a sauna and lockers. In addition, the Student Activities Center sponsors a broad program of intramural and recreational activities held in the Smith Center and designed to accommodate various levels of skill, experience, and interest.

The University is a member of the National Collegiate Athletic Association (NCAA), the Eastern College Athletic Conference (ECAC), and the Atlantic 10 Conference. Its intercollegiate varsity teams compete against major universities throughout the region and nation in such sports as basketball, baseball, soccer, tennis, golf, cross-country, crew, swimming and diving, water polo, volleyball, and gymnastics.

OTHER PROGRAMS AND SERVICES

The major sections that follow describe the undergraduate programs and courses offered by Columbian College of Arts and Sciences, the School of Business and Public Management, the School of Engineering and Applied Science, and the Elliott School of International Affairs. This section briefly indicates some of the University's additional programs, services, and administrative units.

The George Washington University at Mount Vernon College

The George Washington University at Mount Vernon College is located just three miles from the main campus at Foggy Bottom on the 26-acre campus of what was formerly Mount Vernon College. GW at MVC offers a distinct environment within the University, and certain of its programs and opportunities are offered exclusively there, along with a rich selection of courses that meet general curriculum requirements across the University. All academic programs offered on the Mount Vernon campus are fully integrated into those of the schools of the University, and students' participation in classes and activities of the Foggy Bottom campus is encouraged. The University Honors Program also maintains an office on the Mount Vernon campus and offers a wide variety of courses there.

GW at MVC provides the benefits of small classes, close faculty-student relationships, and mentoring and leadership opportunities. While University general curriculum courses at GW at MVC are open to all Foggy Bottom students, course registration priority is given to GW at MVC students. **Special GW at MVC programs and courses are designed particularly for women.**

GW at MVC offers a set of residential experiences under the Elizabeth Somers Women's Leadership programs. The following Women's Leadership programs are under way or under development: Women in International Leadership, Women in Politics and Policy, Women in the Arts, Women in Science and Technology, and Women and Leadership II. Each provides a one-year living and learning experience that offers a set of courses linked around the theme of women's leadership, historical as well as contemporary. Thirty women live together in one residence hall at GW at MVC, taking several academic courses together. The program courses fulfill certain general requirements in all the undergraduate schools. The teaching assistants for the academic courses also live together with the students in the residence hall, developing co-curricular activities that emphasize the supportive community, tying together the various strands of the program. The intent of this program is to create an integrated community, which encourages classroom discussions to spill freely over into the residence hall.

The Student Development Center coordinates student support services for GW at MVC, including the development of programs and services that create a distinctive environment for students on the Mount Vernon campus, cooperative programming with the Foggy Bottom campus, and the cultivation of leadership and community service opportunities for students.

University Honors Program

The University Honors Program is an enhanced educational program open to students enrolled in any of the undergraduate schools at The George Washington University. The Program offers a special series of courses that are designed to enhance the education of undergraduate students. Members of the Honors Program take one or more of these courses each semester as part of their undergraduate course of study. The courses range from small seminars that fulfill general curriculum requirements to special, cross-disciplinary courses.

In addition, the University Honors Program offers its students special academic activities, such as the University Symposium, a weekend-long event that includes public lectures, class discussions, and student presentations on a selected topic or theme. The Program administers two residential learning programs, the Roots of Western Civilization and the Fulbright International Affairs Floor. In these residential programs, both Honors and non-Honors first-year students have the opportunity to live with students with similar academic interests. Select undergraduates may join faculty and graduate students in the University Seminars Series, a special program overseen by the University Honors Program.

Students must apply for admission to the University Honors Program. Entering freshmen who are in the top 10% of their high school class or have achieved SAT scores above the 85th percentile may apply to the University Honors Program when they apply for admission to the University. Current GW students who have achieved a cumulative GPA of 3.4 or higher and have at least four semesters left before graduating may apply to the program; students may apply at the end of September for admission in the spring semester and at the end of January for admission in the fall semester. The University Honors Program accepts a limited number of transfer students who may apply when they seek admission to the University. The program has special advisors to help students plan their majors and prepare for graduate study and fellowship work.

Scholastic requirements for remaining in the University Honors Program are listed under the major head of Honors in the course listings section.

A complete description of the University Honors Program is given in the Honors Program Handbook, available at the Honors Office or through its website: <http://www.gwu.edu/~uhpwww/>. The Honors Program website also gives a list of current classes and activities of the Honors Program.

Enosinian Scholars

Named for the first undergraduate academic society established at The George Washington University in 1822, the Enosinian Scholars Program is a special senior-year thesis program that requires two semesters of research, a written thesis, and an oral examination with outside reviewers. Students in the Enosinian Scholars Program may also pursue Special Honors in their department or program. The University Honors Program administers the Enosinian Scholars Program. Admissions to the Enosinian Scholars Program is by application; check with the University Honors Program Office.

Residential Educational Programs

The University offers several enhanced programs in which 15 to 30 first-year students reside together on one floor of a residence hall and take a common class or series of classes. In most cases, the program is lead by a graduate teaching assistant who resides with the students. The programs currently offered by the University follow (sponsors are listed in parentheses): Roots of Western Civilization (University Honors Program), JWF International Affairs (University Honors Program/Elliott School of International Affairs), Politics and Values (Political Science Department), and Elizabeth Somers Women's Leadership Programs (Mount Vernon Campus Dean's Office). Further information about any program may be obtained from its sponsor.

Joint Degree Programs

Several joint degree programs are available to undergraduates. Five-year bachelor's/master's programs include the B.S./M.A. in economics, the B.S./M.S. in systems engineering/engineering management, the B.A./M.A. in art or psychology/art therapy, the B.S./M.S.F.S. in forensic chemistry (chemistry/forensic sciences), and the B.B.A./M.S.I.S.T., B.B.A./M.T.A., and B.B.A./M.P.A. See the department or school concerned for specific program requirements.

Two joint degree programs are available for study toward the Doctor of Medicine degree: the integrated B.A./M.D. program described under Columbian College of Arts and Sciences, and the early selection program described under the School of Medicine and Health Sciences.

Secondary Fields of Study

A program of secondary fields of study has been established within the University to provide opportunities for formal interschool study. Students must be enrolled in a degree program and must be in good academic standing to be eligible to take a secondary field in another school. The secondary fields generally consist of 12 to 18 hours of prescribed courses, depending on the field, with scholarship requirements determined by the school offering the field. Upon satisfactory completion of all requirements, the title of the secondary field of study and the courses taken in support of the field are entered on the student's transcript. For further information, see the brochure "Secondary Fields of Study" available in the offices of the deans or from the Vice President for Academic Affairs.

Summer Sessions

Courses are offered during the summer by all degree-granting divisions of the University. Summer Sessions also offers special programs that are not available during the regular academic year. Courses are offered during both day and evening hours. Students who are enrolled at the University for the spring semester may register for the following Summer Sessions without special application. Those who wish degree status may seek admission from the appropriate school within the University. Those who do not wish to work toward a degree at the University may apply through the "Quick Entry" process described in the Summer Sessions Announcement. For a complete statement concerning summer term work, see the Summer Sessions Announcement available by request by contacting 202-994-6360 or sumprogs@gwu.edu. Information is also available through the GW Summer Sessions website: <http://www.summer.gwu.edu>.

Study Abroad

Students who wish to study abroad during the academic year should contact the Office for Study Abroad for information concerning eligibility, appropriate procedures, and requirements for participation. Students must have a 2.5 cumulative grade point average and second-semester sophomore status at the time of application to be approved for study abroad. Students who have a significant disciplinary history or who are on academic or disciplinary probation at the time of application are not eligible to study abroad. All programs of study abroad must be approved on the required forms by the appropriate faculty and administrative personnel prior to departure. Course credits earned in authorized programs with a C or above are transferable toward the appropriate degree at The George Washington University, provided there is no duplication of work done previously and faculty have approved each course with a GW course equivalent. Participants agree to abide by all procedures and regulations for study abroad as indicated in the Study Abroad Handbook, Memorandum of Agreement, and Participation Agreement distributed through the Office for Study Abroad. In addition to academic year programs, study abroad is available at varying locations during the summer. Information on GW summer programs abroad is available in the GW Summer Sessions Announcement.

Office of University Students

The Office of University Students makes on-campus, credit-bearing courses available to those who are not currently degree candidates at this University. Such students, often employed in government or industry, may be taking courses to enhance their career potential or as a matter of personal interest. They may be candidates for higher degrees at other institutions, sent here for special work as part of a graduate program. They may be undergraduates matriculated elsewhere, taking courses for transfer to their own institution or preparing for graduate work.

The Office of University Students requires a minimum registration of 3 credit hours per semester or session, except in special circumstances as approved by the director. Medical and law courses are not available to nondegree students.

Entrance Requirements—The Office of University Students requires visiting, nondegree applicants to have appropriate academic preparation prior to enrollment. Prerequisites are specified in the departmental course descriptions in this Bulletin. Contact the specific department for further information regarding appropriate academic background for a particular course. In addition, the applicant who has previously attended this or another college or university must be in good standing at that institution. An applicant who has been suspended from

any educational institution for poor scholarship will not be considered for admission for one calendar year after the effective date of the suspension. An applicant who has been denied undergraduate admission within this University will not be considered for admission as a nondegree student for the same semester for which the application was denied. Applications for admission through the Office of University Students for a fall or spring semester are necessary for high school students and for international students. International nondegree students should obtain the form from and return it to the Office of University Students. High school students should obtain the form from and return it to the Office of Admissions. There is no application fee. For information on registration, please refer to the *Schedule of Classes* or visit <http://www.gwu.edu/~ous>.

Tuition and Fees—For information regarding fall and spring semester tuition and fees, see Fees and Financial Regulations in this Bulletin. For information regarding summer tuition and fees, see the Summer Sessions Announcement, available by request, by contacting 202-994-6360 or sumprogs@gwu.edu. Information is also available through the GW Summer Sessions website: <http://www.summer.gwu.edu>.

Regulations—Prospective and registered students are urged to acquaint themselves with the regulations concerning attendance and withdrawal under University Regulations in this Bulletin.

The deadline for adding a course during the regular fall and spring semester is the end of the second week of classes. A course dropped during the first four weeks of classes will not appear on a student's transcript. A course dropped after the fourth week but before the end of the eighth week will be assigned the grade of *W* (Authorized Withdrawal). The deadline for dropping a course without academic penalty is the end of the eighth week of classes. The deadline for complete withdrawal from a student's entire program of courses without academic penalty is the end of the ninth week of classes.

If a grade of *I* (Incomplete) is assigned, the instructor normally sets a period (maximum of one year) within which the uncompleted work must be made up. An Incomplete that is not changed within one calendar year becomes a grade of *IF* on the student's record.

All adjustments to course schedules during a regular summer session must be made within the first seven days of the official start of classes.

Consortium of Universities of the Washington Metropolitan Area

The George Washington University is a member of the Consortium of Universities of the Washington Metropolitan Area. Eleven universities in the Washington area—American University, Catholic University of America, Gallaudet University, George Mason University, George Washington University, Georgetown University, Howard University, Marymount University, Southeastern University, the University of the District of Columbia, and the University of Maryland—are associated in a Consortium through which they coordinate the use of their respective facilities; Trinity College is an associate member of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings the particular courses that best meet their needs. This privilege is subject to regulations of the school in which the student is enrolled. Participation is limited to degree candidates. Law and medical students are excluded from participation, except for LL.M. candidates. See the *Schedule of Classes* for specific regulations and information concerning registration for Consortium courses.

Registration forms and instructions are available from the registrar of the institution in which the student is enrolled. Students register and pay tuition at

their own institutions for all Consortium courses; course fees are payable to the visited institutions.

George Washington University students may enroll through the Consortium in the Army ROTC program offered at Georgetown University, the AFROTC program at the University of Maryland, or the Army ROTC or AFROTC at Howard University. Scholarships are available. Those interested should contact the ROTC enrollment officer at one of these universities. Limited credit for such courses (primarily advanced ROTC) may be assigned for electives to meet degree requirements at George Washington University; prior approval is required by the dean of the school in which the student is enrolled.

The University Libraries

The George Washington University is a member of the Association of Research Libraries. The library collections of the University are housed in the Melvin Gelman Library (the general library of the University), Jacob Burns Law Library, Paul Himmelfarb Health Sciences Library, and Eckles Memorial Library on the Mount Vernon campus.

These collections contain over 2 million volumes. University appropriations supplemented by endowments and gifts provide research materials in the social sciences, the humanities, the sciences, and business. Gifts from many sources have enriched the collections, including a large National Endowment for the Humanities grant to strengthen the University's humanities holdings. The libraries hold over 18,000 serials.

Information concerning the use of the libraries may be obtained from the GW Information System, Gelman home page, and at library service desks. Individual and class instruction in the use of the library and orientation to library facilities are given by librarians upon request as well as through print, media, and computer-assisted instruction. The libraries strive to fulfill the curricular and research needs and interests of the students. Through computerized searches of bibliographic databases, students identify and locate desired research materials not easily found through more traditional methods. The staff assists all members of the University in using the rich resources of the Washington area and the unusual opportunities they offer for extensive research.

Students, faculty, and staff at George Washington University (except law and medical students) may borrow directly from the main campus libraries of six other academic institutions in the Washington Research Library Consortium (WRLC). Students may also obtain books and journal articles on interlibrary loan from other libraries in the area and throughout the United States.

ALADIN is the electronic library resource of WRLC and contains the combined on-line catalog of the seven member universities with more than 4.3 million records, as well as a rich array of electronic databases, indexes, and full texts. ALADIN can be accessed from numerous computers in the libraries as well as remotely from on and off campus.

Information Technology Services

Information Technology (IT) Services provides technical assistance and training to users of technology within the GW community. Students, faculty, and staff are eligible to receive electronic mail accounts through IT Services. A variety of training options include free seminars on commonly used systems, walk-in and over-the-phone assistance, and a virtual help desk.

Center for Academic Technologies

The Center for Academic Technologies supports all aspects of instruction, including assisting faculty in the development of new teaching approaches and

materials and the operation of the University's many technology-enhanced classrooms and computer laboratories, which are available to all students for class projects and individual research.

GW Television

The primary television and multimedia resource of the University is GW Television, a state-of-the-art multichannel broadcast and production facility. GW Television develops courses and programs in cooperation with academic departments and outside clients for distribution on and off campus over various satellite and cable networks and in multimedia and web-based formats; produces videotapes and CD-ROMs for class use and for continuing professional education; offers national and international satellite videoconferencing and point-to-point interactive compressed video teleconferencing, and can deliver programming to many on-campus locations; manages compressed video links between remote campus locations; operates George Washington University Cable Television (CTV).

The Writing Center

In conjunction with the Department of English, the Writing Center provides writing instruction to GW students at all levels of experience and expertise. Students are assisted in identifying writing problems and learning how best to express ideas. Trained tutors (undergraduate peer tutors, graduate students, and the director and other members of the faculty) work with students individually on areas of specific need or interest. Tutors provide assistance in such areas as organizing a mass of information efficiently and clearly, using correct grammar and punctuation, getting started on a writing project, developing a thesis, providing evidence in support of an argument, and presenting the findings of an experiment or the solution to a research problem.

The Speech and Hearing Center

The Speech and Hearing Center provides diagnosis and treatment of a wide range of speech, language, and hearing disorders. These include developmental impairments of articulation and language, stuttering, voice disorders, and speech and language impairments resulting from neurological damage. Services are available for persons wishing to modify a regional dialect or foreign accent. Evaluation and aural rehabilitation are also provided for hearing-impaired individuals. The Speech and Hearing Center operates in conjunction with the Department of Speech and Hearing.

Honor Societies

Honor societies that maintain active chapters at George Washington University include Phi Beta Kappa and Sigma Xi as well as those specific to given academic fields, such as Alpha Epsilon Delta, Beta Alpha Psi, Beta Gamma Sigma, Delta Phi Alpha, Eta Kappa Nu, Omicron Delta Epsilon, Omega Rho, Pi Alpha Alpha, Pi Sigma Alpha, Pi Tau Sigma, Psi Chi, Sigma Delta Pi, Sigma Iota Rho, and Tau Beta Pi. The freshman honor society Phi Eta Sigma is open to qualified students in all undergraduate programs.

Prizes

The following academic prizes are supported by permanently endowed funds established through the Office of the Vice President and Treasurer. The many other prizes and awards available to GW students are funded annually, rather than by permanent endowment, and are listed in the annual commencement program when information is provided in time for publication.

Abdelfattah Abdalla Prize—Awarded annually to a junior or senior in the Department of Electrical Engineering and Computer Science for scholarship and service.

Norman B. Ames Memorial Prize—Awarded annually to a graduating senior in the School of Engineering and Applied Science who has made significant contributions to the School and the University.

Buka Family Prize—Provided by Ruth Buka in honor of her parents, Georg and Rosa Buka, and her sister, Hilde Buka-Lacour. It is awarded to the most outstanding student in German languages and literatures.

Byrne Thurtell Burns Memorial Prize—Awarded to the senior majoring in chemistry who shows the greatest proficiency in organic chemistry, as evidenced by a comprehensive examination, and who possesses such qualifications of mind and character as to give promise of future achievement.

Wilbur J. Carr Prize—Established in 1962 by Edith K. Carr, former Trustee of the University, in memory of her distinguished husband, who was graduated from the School of Comparative Jurisprudence and Diplomacy in 1899. It is awarded annually to that student in the graduating class of the University who has demonstrated outstanding ability in the study of international affairs and who has given evidence of possessing in marked degree the qualities that produce the good citizen and the dedicated public servant.

Astere E. Claeysens Prize—Established in 1981 by the Trustees of the Bess and Arthur Dick Family Foundation. It is awarded for the best original work in playwriting by a student enrolled in the University.

John Henry Cowles Prizes—Two prizes, established by John H. Cowles, Grand Commander of the Supreme Council of Thirty-third Degree (Mother Council of the World) of the Ancient and Accepted Scottish Rite of Freemasonry, Southern Jurisdiction of the United States of America. Awarded upon graduation to the graduate or undergraduate student with the best overall scholastic achievement and leadership potential in the School of Business and Public Management and in the Elliott School of International Affairs.

DeWitt Clinton Croissant Prize—Awarded annually to the undergraduate student enrolled in a course in drama or active in University dramatics who submits to the English Department the best essay on drama or the theater.

E.K. Cutter Prize—Established by Marion Kendall Cutter "for excellence in the study of English." Awarded to the member of the graduating class whose record in English, combined with general excellence, shows the most marked aptitude for and attainment in English studies.

Isaac Davis Prizes—Established in 1847 and awarded annually to the three seniors who have made the greatest progress in public speaking while enrolled in the University. Awards are determined by a public-speaking contest in which the participants deliver original orations. Only members of the senior class of Columbian College who are candidates for the degree of Bachelor of Arts or Bachelor of Science are eligible to compete.

Elton Prize—Established by the Reverend Romeo Elton, of Exeter, England, and awarded annually to the student with the highest average in the most advanced course in the Greek language and literature.

Jesse Frederick Essary Prize in Journalism—Established by Helen Essary Murphy and awarded annually to a student who has given promise of sound citizenship and who submits the best printed and published evidence of ability in "forthright reporting" and good journalistic writing in a student publication or elsewhere.

Jessie Fant Evans Prize—A bequest of Joshua Evans, Jr., in 1971, in recognition of his wife's distinguished record at and service to the University, on whose Board of Trustees she served as the first woman member. Awarded annually to an outstanding senior student in a contemporary history course.

Joshua Evans III Prize in Political and Social Science—A memorial prize "established by friends because of an outstanding life." Awarded annually to that student in the graduating class "who has demonstrated his/her signal ability in

the social and political sciences and who has given promise of the interpretation of that ability in good citizenship among his/her fellows."

Willie E. Fitch Prize—Established by James E. Fitch in memory of his son. Awarded annually to a senior student for the best examination in chemistry.

Alfred Martin Freudenthal Prize—Awarded annually to the senior in the School of Engineering and Applied Science who graduates with the highest scholastic standing.

Charles E. Gauss Prize—Established in honor of Charles E. Gauss, Elton Professor of Philosophy from 1945 to 1964. Awarded annually to a graduating senior for excellence in philosophy.

Alice Douglas Goddard Prize—A memorial established by Frederick Joseph Goddard, of Washington, D.C. Awarded annually to the senior student making the highest average in American literature.

Edward Carrington Goddard Prize—Established by Mary Williamson Goddard, Alice Douglas Goddard, and Frederick Joseph Goddard, of Washington, D.C., in memory of Edward Carrington Goddard, class of 1881. Awarded to the junior or senior student making the highest average in French language and literature.

Morgan Richardson Goddard Prize—A memorial established by Mary Williamson Goddard, Alice Douglas Goddard, and Frederick Joseph Goddard, of Washington, D.C. Awarded to the junior or senior student making the highest average in the following fields: business administration, economics, international business, or public accounting.

Harmon Choral Prize—Established in 1986 in memory of Dr. Robert H. Harmon, director of the Glee Club from 1924 to 1964, by his brother Bishop Nolan Harmon and the GW Department of Music. Awarded annually to one or two students who have made outstanding contributions to the choral programs.

Ching-Yao Hsieh Prize—Two prizes awarded annually, one to an undergraduate and one to a graduate student in the Department of Economics.

Gardiner G. Hubbard Memorial Prize in United States History—Established by Gertrude M. Hubbard in memory of her husband and awarded annually to that member of the graduating class majoring in history who has maintained the highest standing in courses in United States history.

Cecille R. Hunt Prize—Offered annually to deserving art students and every two or three years to participants in the University's Art Alumni Exhibition.

Korean Language and Culture Prize—Awarded annually to a student enrolled in a Korean language/culture course.

David Lloyd Kreeger Prizes in Art—Eight prizes given by Mr. Kreeger, six in the fine arts and two in art history (including museology). Fine arts prizes are awarded to a senior or graduate student in painting, sculpture, printmaking, ceramics, photography, and visual communication. One prize in art history is awarded to a senior and one to a graduate student. Candidates for the prizes must submit original papers or works of art. Winners are selected by distinguished representatives of the field of art in the Washington, D.C., area.

Minna Mirin Kullback Memorial Prize—Established in 1968 by Solomon Kullback in memory of his wife. Awarded annually by a committee of faculty members of the Department of Statistics to a full-time undergraduate or graduate student majoring in statistics, who will have completed 18 credit hours of statistics courses by the end of the spring semester.

John Francis Latimer Prize in Classics—Established in 1973. Awarded to a graduating senior who has made the most outstanding record as a major in the Department of Classics.

Martin Mahler Prize in Materials Testing—Awarded to the upper-division or graduate student in engineering who submits the best reports on tests in the materials laboratory course, with preference given to prestressed concrete tests.

Hilda Haves Manchester Prize in Sociology—Established in honor of Hilda Haves Manchester, B.A. 1932, an outstanding student whose major field was

sociology. Awarded annually by Columbian College to the senior student majoring in sociology who has the highest scholastic record.

The Barry Manilow Endowed Prize in Music—Established in 1983. Awarded annually to a student majoring in music. The award is made on the basis of academic performance and musical ability, as determined by a committee of faculty appointed by the chair of the Music Department.

Vivian Nellis Memorial Prize—Awarded to a student in the English Department who has shown special promise in the field of creative writing.

Ruggles Prize—Established by Professor William Ruggles in 1859. Awarded annually to a candidate for a bachelor's degree for excellence in mathematics.

Howard C. Sacks Prize—Awarded to a student in political science who has demonstrated outstanding academic achievement in the study of Far Eastern affairs.

Hermann and Johanna Richter Schoenfeld Prize—Established in grateful appreciation of the inspired teaching and devotion to his students of Dr. Hermann Schoenfeld, who for more than 20 years until his death in 1926 headed the Department of German. Hermann Schoenfeld, Ph.D., LL.D., was widely recognized as a scholar of distinction whose presence on the faculty added prestige to the University. This prize is given annually to a member of the graduating class for excellence in historical and cultural phases of German studies.

Julian H. Singman Prizes—Two prizes awarded annually, one in design and one in aquarelle painting.

Sylvia S. Speck Prize—Awarded to a graduating senior for exemplary academic achievement in English literature.

Staughton Prize—Established by the Reverend Romeo Elton and awarded annually to the student making the best record in the most advanced courses in Latin language and literature.

Alfred E. Steck Memorial Prize—Awarded for proven excellence in the field of sculpture.

James MacBride Sterrett, Jr., Prize—Established in 1911 by Professor Sterrett in memory of his son. Awarded annually to the student who obtains the highest average in Physics 1 and 2.

Charles Clinton Swisher Historical Club Prize—Established in 1936 by the Charles Clinton Swisher Historical Club and augmented in 1941 by the bequest of Professor Swisher. Awarded annually to the student who submits the best essay covering some phase of medieval history.

Thomas F. Walsh Prize—Established in 1901 and awarded annually to the student who submits the best essay in Irish history.

Alexander Wilbourne Weddell Prize—Established in 1923 by Virginia Chase Weddell in memory of her husband. Awarded annually to a degree candidate who writes the best essay on "the promotion of peace among the nations of the world." The prize essays shall become the property of the University and shall not be printed or published without the written consent of the University. The University reserves the right to withhold the award if no essay attaining the required degree of excellence is submitted.

GW Alumni Association

The objectives of this organization are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Membership in the Association is conveyed automatically to anyone who has been graduated from any school or division of the University. Anyone who has earned 15 credit hours or the equivalent at the University, who has left the University in good standing, and whose class has graduated is eligible for membership; in the case of the Office of University Students, however, only the "15 credit hours earned" requirement and not the "graduation of the class" require-

ment applies. Graduates of Center for Professional Development certificate programs are also eligible.

A Governing Board, composed of members representing the constituent alumni organizations, directs the activities of the Association. The voluntary leadership of the Association works closely with the staff of the Office of Alumni Relations in carrying out Association affairs. The Association may be contacted through the Office of Alumni Relations.

UNIVERSITY REGULATIONS

Students enrolled in the University are required to conform to the following regulations and to comply with the requirements and regulations of the school in which they are registered. Students who withdraw or are suspended, or who, for any other reason, are not registered at the University for one semester or more, may reapply and, if readmitted, continue their program only under the regulations and requirements in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission or any other University document, the student's registration may be canceled. If such falsification is discovered after the student has matriculated at the University, the student may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the faculty) for subsequent registration in the University.

Registration

Information on registration procedures is stated in the *Schedule of Classes*, which is available in advance of each semester.

Registration in courses is open only to those persons formally admitted to the University by the appropriate admitting office, as well as those students in good standing who are continuing in an approved program of study.

No registration is accepted for less than a semester or one summer session.

Students may not register concurrently in this University and another institution without the prior permission of the dean of the school in which they are registered in this University. With the exception of students enrolled in a joint degree program, registration in more than one school of the University requires the written permission of the deans concerned, prior to registration. Registration is not complete until all financial obligations have been met.

Eligibility for Registration—Registration for the following categories of on-campus students is held on the days of registration published in the *Schedule of Classes*. A student who is suspended or whose record is encumbered for any reason is not eligible to register. Registration in a given course may be denied nondegree students in the Office of University Students when space is needed for degree candidates.

New Student—Upon receipt of a letter of admission, the new student is eligible for registration on the stated days of registration.

Readmitted Student—A student previously registered in the University who was not registered during the preceding semester must apply for and be granted readmission by the appropriate admitting office before being eligible for registration.

Continuing Student—A student registered on campus in the immediately preceding semester or the summer session preceding the fall semester is eligible to register assuming good standing and enrollment in a continuing program.

Completion of Registration—Registration is not complete until financial obligations have been fulfilled. Students who do not complete their financial obligations in a timely manner may have their registration canceled and will not be permitted to attend class.

Registration for Consortium Courses—Degree students interested in taking courses at any of the other institutions in the Consortium of Universities of the Washington Metropolitan Area, Inc., should consult the program announcements of the other institutions. Consortium registration forms and instructions may be picked up in the Office of the Registrar. In order to participate in the Consortium program, students must obtain the approval of an advisor and should ascertain from the department of the institution where the course is taught whether they are eligible for the course and whether there is space in the class. Specific inquiries should be addressed to the Registrar's Office. Detailed information concerning Consortium policy and procedures is printed in the *Schedule of Classes* and is available at the Registrar's Office website.

Adding and Dropping Courses

During the registration period (before the end of the second week of classes) students may add or drop courses using GWeb. After the second week of classes, students who wish to add or drop a course must complete a Registration Transaction Form and submit the form to the office of their dean; forms are available on line, at deans' offices, and in the Office of the Registrar. Adding a course after the second week requires a signature of the instructor or other authorized member of the department.

A course dropped during the first four weeks of classes will not appear on the student's transcript. A course dropped after the fourth week but before the end of the eighth week will be assigned a notation of *W* (Authorized Withdrawal).

The deadline for dropping a course without academic penalty is the end of the eighth week of classes in the fall and spring semesters. After the end of the eighth week of classes, dropping a course without academic penalty is only possible after the student presents a petition to the dean and receives written permission.

All charges for courses from which the student withdraws are subject to the refund policy listed under Fees and Financial Regulations in this Bulletin. Failure to withdraw by these procedures can result in an extended financial obligation and the recording of a grade of *F* (Failure) or a notation of *Z* (Unauthorized Withdrawal).

Changes in Program of Study

Changes Within a School—A student may not substitute one course for another within an established program of study or change status from credit to audit or from audit to credit without the approval of the dean of the school in which he or she is registered. Change from one major field to another within the same school may be made with the approval of the dean.

Transfer Within the University—Application for transfer to another school must be made to the appropriate admitting office on the form provided by the office concerned. Students transferring within the University are advised to study carefully the requirements listed below under Graduation Requirements and to note that unless otherwise specified, in all undergraduate divisions, 30 credit hours, including at least 12 credit hours in the major field, must be completed while registered in the school from which the degree is sought. Upon

transfer the student should consult the dean concerned and understand clearly the requirements that must be fulfilled. A maximum of 45 credit hours earned through the Office of University Students may be applied toward a bachelor's degree in the degree-granting schools of the University.

Grades

Grades are made available to students through the Office of the Registrar after the close of each semester. The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail; other grades that may be assigned are *A-*, *B+*, *B-*, *C+*, *C-*, *D+*, and *D-*. Symbols that may appear include *AU*, Audit; *I*, Incomplete; *IPG*, In Progress; *W*, Authorized Withdrawal; *Z*, Unauthorized Withdrawal; *P*, Pass; *NP*, No Pass.

Except for courses that specifically state that repetition for credit is permitted, a candidate for a degree at this University may not repeat a course in which a grade of *D* or better was received, unless required to do so by the department concerned. A written statement, indicating that the student is required to repeat the course, must be submitted to the student's dean by the appropriate department chair.

The symbol of *Z* is assigned when students are registered for a course that they have not attended or have attended only briefly, and in which they have done no graded work. At the end of the academic year, students' records are reviewed; if there is more than one *Z* per semester, a student's record will be encumbered until released by the student's advisor or academic dean. The symbol of *Z* is not a grade but an administrative notation.

Incompletes—The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given the instructor for the student's inability to complete the required work of the course. At the option of the instructor, *I* may be recorded if a student, for reasons beyond the student's control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. *I* may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course that is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, that instructor may initiate an appropriate grade change.

When work for the course is completed and a grade change turned in to the Office of the Registrar, the grade earned will be indicated in the form of *I*, followed by the grade. The indication of *I* cannot be removed from the transcript. For more information concerning changing a grade of Incomplete, consult the regulations of the school concerned.

The Grade-Point Average—Scholarship is computed in terms of the grade-point average, obtained by dividing the number of quality points by the number of credit hours for which the student has registered, both based on his or her record in this University. The grade-point average is computed as follows: *A*, 4.0; *A-*, 3.7; *B+*, 3.3; *B*, 3.0; *B-*, 2.7; *C+*, 2.3; *C*, 2.0; *C-*, 1.7; *D+*, 1.3; *D*, 1.0; *D-*, .7; *F*, 0, for each credit hour for which the student has registered in a degree program. Although credit value for a course in which a grade of *F* is earned appears on the transcript for the purpose of calculating the grade-point average, no academic credit is awarded. In the case of a student who is allowed to repeat a course, the first grade received remains on the student's record and is included in the grade-point average. Courses marked *AU*, *CR*, *I*, *IPG*, *P*, *NP*, *W*, or *Z* are not considered in determining the average, except that courses marked *I* will be considered when a final grade is recorded. With the exception of Consortium courses, grades in courses taken at other institutions are not considered in computing the grade-point average.

Honors

Bachelor's degrees with honors are awarded to students whose academic records give evidence of particular merit. The student's grade-point average determines the level of honors as follows: *cum laude*, 3.4–3.59; *magna cum laude*, 3.6–3.79; *summa cum laude*, 3.8–4.0. The grade-point average includes all course work completed at GW. To be eligible for an honors designation, a student must complete at least 60 hours of course work at GW.

The grade-point average is calculated by the Office of the Registrar, and the honors designation is entered on the transcript and diploma of those students who earn an honors designation. If Latin honors are entered in the commencement program, honors status will be determined on the basis of work completed by the end of the seventh term and entered only for those students who have completed seven-eighths of the credit hours required for the degree. Latin honors indicated on the diploma are calculated on the basis of all course work completed. The diploma and transcript are the official indication that a degree was conferred and Latin honors awarded.

Special Honors

Special Honors may be awarded by the faculty to any member of the graduating class for outstanding achievement in the student's major field on recommendation of the major department. The student must fulfill all of the following requirements: (1) Candidacy for Special Honors must be approved by the faculty member representing the major department or field not later than the beginning of the senior year. (2) Such other conditions as may be set at the time the candidacy is approved must be met. (3) At least one-half of the courses required for the degree must have been completed at GW. (4) The specific requirement of the school in which the student is registered must be fulfilled as follows: (a) Columbian College of Arts and Sciences—grades of A through B– in 50 percent of the courses taken at GW; (b) the School of Engineering and Applied Science or the School of Business and Public Management—a grade-point average of at least 3.0 on all course work taken at GW; (c) the Elliott School of International Affairs—a grade-point average of at least 3.4 on all course work taken at GW. Special honors awards appear on the transcript.

Graduation Requirements

Degrees are conferred in January, May, and August. To be recommended by the faculty for graduation a student must have met the admission requirements of the school in which registered; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree as stated in this bulletin; filed an application for graduation by the published deadline date; and be free from all indebtedness to the University. Enrollment is required for the semester or summer at the close of which the degree is to be conferred, and all degree requirements must be completed by the last day of final examinations for that semester or summer session.

Participation in the Commencement Ceremony—Participation in the annual commencement ceremony held in May is open to students who have applied to graduate in the current spring semester or who graduated the preceding fall semester or summer session. Students, graduate or undergraduate, who need no more than 9 credit hours credit to complete their degree requirements, may participate in May commencement ceremonies if there is a reasonable expectation that they will be able to obtain the needed credits during the following summer. The maximum of 9 credit hours is firm and not subject to petition. Summer graduates who elect to attend the preceding May ceremony must apply for graduation no later than February 1. Students who apply after the published deadlines are not guaranteed commencement materials and may not be listed in the commencement program.

Continuous Enrollment Status

Once entered in a degree program, a student is expected to be continuously enrolled and actively engaged in fulfilling the requirements for the degree each semester of the academic year until such time as the degree is conferred. A student is considered to be continuously enrolled when registered for courses or when engaged in and appropriately registered for activities such as the following, with the prior approval of the school in which the student is enrolled: cooperative work semester; study abroad program; attendance at another institution with prior approval to have work transferred back to the GW program; completion of outstanding work in courses in which a grade of Incomplete or In Progress was received (at the undergraduate level); or non-course instructional activities unique to the particular school. This status is generally limited to one year. Should the student break continuous enrollment at the University and not request and be granted a leave of absence (see below), he or she must apply for readmission and, if granted, be subject to the requirements and regulations then in force.

Leave of Absence

Should a degree student find it necessary to interrupt active pursuit of the degree, he or she may petition the dean for a leave of absence for a specific period of time, generally limited to one calendar year. A degree student who discontinues active enrollment in degree studies without being granted a leave of absence, or a student granted a leave who does not return to active study at the close of the period of approved absence, must apply for readmission and be subject to the regulations and requirements then in force. The right to use of University facilities is suspended while the leave is in effect.

Policy Regarding Students Called to Active Military Duty

Any student who is a member of a military reserve unit or the National Guard and is activated or called to active duty early in a semester or summer session automatically will be entitled to a full refund of all tuition and fees that he or she has paid toward the expenses of that academic term. If the notification of the call to active duty comes after the mid-term examinations or after other substantial graded work has been completed, the student will have the option of either taking a full refund of tuition and fees or taking an Incomplete in his or her courses with the privilege of returning to complete all required coursework at some future date without payment of any further tuition and fee charges. It is the responsibility of the student to present evidence of his or her activation to the Office of Student Accounts and to request the appropriate refund.

Should a degree student called up for active duty find it necessary to interrupt active pursuit of the degree he or she may petition the dean for a leave of absence for a specified period of time, generally limited to one calendar year. Deans are encouraged to grant any request to extend the leave of absence for longer than the customary period should military service require an absence of more than one year.

All students on active duty will be automatically exempted from the request for a \$50 voluntary library contribution without requiring any communication from them or their initials on the bill.

Complete Withdrawal From the University

A degree-seeking student who wishes to withdraw from all courses during a given semester must complete a Complete Withdrawal Form and submit it to the Office of the Registrar. Forms are available on line, at deans' offices, and in the Office of the Registrar. The deadline for complete withdrawal from all courses without aca-

demic penalty is the end of the ninth week of classes. Complete withdrawal after the ninth week requires a petition to the dean.

All charges for courses from which the student withdraws are subject to the refund policy listed under Fees and Financial Regulations in this Bulletin. Failure to complete a Complete Withdrawal Form can result in an extended financial obligation and the recording of grades of *F* (Failure) or notations of *Z* (Unauthorized Withdrawal).

University Policies and Definitions

University Policy on Equal Opportunity—The George Washington University does not unlawfully discriminate against any person on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation. This policy covers all programs, services, policies, and procedures of the University, including admission to educational programs and employment. The University is also subject to the District of Columbia Human Rights Law.

Inquiries concerning the application of this policy and federal laws and regulations regarding discrimination in education or employment programs and activities may be addressed to Susan B. Kaplan, Associate Vice President for Human Resources, The George Washington University, Washington, D.C. 20052, (202)994-4433, or to the Assistant Secretary for Civil Rights of the U.S. Department of Education.

Academic Integrity—The University community, in order to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations. Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper University channels. Copies of the University Code of Academic Integrity can be obtained from the following officers: all department chairs, all academic deans, the Registrar, and the Vice President for Academic Affairs.

Patent and Copyright Policies—Students who produce creative works or make scientific discoveries while employed or supported by the University or through substantial use of University resources are subject to the University's patent and copyright policies (see <http://www.gwu.edu/~research> under Intellectual Property).

Human Research Requirements—Students who are planning to conduct research involving the use of human subjects (for a thesis, dissertation, journal article, poster session, etc.) must obtain Institutional Review Board (IRB) approval before collecting any data. In order to receive this approval, contact the Office of Human Research, Ross Hall, Suite 712, 202-994-2715, to submit the study for the approval process.

The Library—All students registered in the University have the privilege of using the University's Gelman Library. Its stacks are open, and all students are welcome to browse. Authorized GW identification is needed to enter the library and to borrow books. Any book that circulates is subject to recall by the library if needed for reserve or requested by another user after a minimum of 20 days. Reserve books must be used in the library, except that they may be withdrawn for overnight use two hours before closing time. Transcripts of grades are withheld until a student's library record is clear, with all borrowed books returned

and any fines paid. All students using the University's Gelman Library are expected to be familiar with its detailed regulations, available at any of the library's service desks.

Use of Correct English—A report regarding any student whose written or spoken English in any course is unsatisfactory may be sent by the instructor to the dean of the school, who may assign supplementary work, without academic credit, varying with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the dean.

Name of Record—A student's name of record includes the first name, middle initial or full middle name, and the family name. Nicknames may not be used. The University will change the name of a currently enrolled student on its official records but will require satisfactory evidence of a legal basis for the change. The diploma is awarded under the official name of record at the time of graduation.

Student Status—For the purpose of defining student status, undergraduates taking 12 or more credit hours are considered to be full time, those taking 6 to 11 hours are considered to be half time, and all others are considered to be part time.

Generally, a student becomes a sophomore upon completion of 30 credit hours, a junior upon completion of 60 credit hours, and a senior upon completion of 90 credit hours.

Attendance—Students may attend only those classes for which they are officially registered. Regular attendance is expected. Students may be dropped from any course for undue absence. A student suspended for any cause may not attend classes during the period of suspension. Students are held responsible for all of the work of the courses in which they are registered, and all absences must be excused by the instructor before provision is made to make up the work missed.

Credit—Credit is given only after completion of registration in a course and satisfactory completion of the required work, or upon the assignment of advanced standing in accordance with the regulations of the school concerned.

Auditing—A person who has been admitted to the University may be registered, with the permission of the instructor, as an auditor in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not repeat it later for credit. Tuition is charged at the prevailing rate.

Post-Admission Transfer Credit—Students who plan to attend another institution and apply credit so earned toward graduation from this University must first secure the written approval of their dean. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

Transcripts of Record—Official transcripts of student records are issued upon written request of the student or former student who has paid all charges, including any student loan installments, due the University at the time of the request. A nominal fee is charged for each official transcript. Unofficial copies of transcripts are mailed to students, by written request, at a nominal fee. Partial transcripts are not issued.

Student Conduct—All students, upon enrolling and while attending The George Washington University, are subject to the provisions of the *Guide to Student Rights and Responsibilities*, which outlines student freedoms and responsibilities of conduct, including the Code of Student Conduct, and other policies and regulations as adopted and promulgated by appropriate University authori-

ties. Copies of these documents may be obtained from the Office of the Dean of Students or from the offices of the academic deans. Sanctions for violation of these regulations may include permanent expulsion from the University, which may make enrollment in another college or university difficult. Regulations or requirements applicable only to a particular program, facility, or class of students may not be published generally, but such regulations or requirements shall be published in a manner reasonably calculated to inform affected students.

Right to Dismiss Students—The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

Right to Change Rules and Programs—The University reserves the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine. The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

University Policy on the Release of Student Information—The Family Educational Rights and Privacy Act (FERPA) applies to institutional policies governing access to and release of student education records.

The University may release the following directory information upon request: name, local address including e-mail, and telephone number; name and address of emergency contact; dates of attendance; school of enrollment; field of study; enrollment status; credit hours earned; degrees earned; honors received; participation in University-recognized organizations and activities (including intercollegiate athletics); and height, weight, and age of members of athletic teams, as well as likenesses used in University publications. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

Copies of the University's full policy statement on the release of student information is published in the *Guide to Student Rights and Responsibilities*, available in the Office of the Dean of Students or the offices of the academic deans.

Property Responsibility—The University is not responsible for the loss of personal property. A Lost and Found Office is maintained on campus in the University Police Office.

The Schools

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Interim Dean J. Folkerts

Executive Associate Dean E.A. Caress

Associate Deans F.C. Arterton, N.K. Khatcheressian,

K. Moreland, M. Moses, M.A.P. Saunders

Since its founding in 1821, Columbian College, the original college of liberal arts and sciences of The George Washington University, has been the cornerstone of the campus community. Columbian College of Arts and Sciences today houses all undergraduate and graduate programs in the arts and sciences, offering bachelor's, master's, and doctoral degrees. With a full-time faculty of about 375, the College offers its 5,300 undergraduates the advantages of a small liberal arts institution as well as opportunities for professional and pre-professional education in many fields and for internships in a stimulating urban environment.

The rich and diverse arts and sciences curriculum is designed to strengthen the student's ability to analyze the social, cultural, and physical environment and to communicate findings in an articulate fashion. These purposes are accomplished by means of the study of various disciplines—the humanities, the social sciences, and the mathematical and natural sciences. With this foundation, Columbian College graduates are well prepared for a wide range of careers or for more specialized professional and graduate education. Students may elect one of 48 departmental majors, or they may elect double majors, interdisciplinary majors, or individualized degree programs. Special curricular guidance is given to students planning to apply to a medical or law school.

The Bachelor's Degrees

Columbian College offers undergraduate programs leading to the degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Fine Arts, and Bachelor of Music. In cooperation with the School of Medicine and Health Sciences, two seven-year curriculums leading to the combined degrees of Bachelor of Arts and Doctor of Medicine and the Integrated Bachelor of Arts/Doctor of Medicine are offered.

One hundred twenty hours of course work must be passed and a grade-point average of at least 2.0 maintained. Note that some courses outside Columbian College (notably exercise and sport activities courses) do not count toward the 120-credit requirement. General curriculum, major, and other requirements described below must be met.

Each student must declare a major during the sophomore year. A student will normally declare a major in the third full-time semester but not later than the registration period during the fourth full-time semester or the semester following completion of 45 credit hours, whichever comes first. A student may change the major with the consent of the dean and of the department or committee concerned; the student must meet the requirements for the new major in effect at the time the change is approved. At least 60 hours of course work must be taken outside the major-field department or major program. (This does not apply to the Bachelor of Fine Arts or the 129-hour Bachelor of Music curriculums.)

See Scholarship Requirements under University Regulations for an explanation of how the grade-point average is computed. See Scholarship Performance in the Major, below, for requirements applicable specifically to major programs.

All students, including those transferring from other institutions or from another school or division of this University, with major requirements wholly or substantially met, must satisfy the residence requirement of Columbian College stated below.

Residence

Students must complete 45 of the final 60 hours toward the degree in the College, including at least 12 hours of course work at the 100 level in the major field. (Students approved for study abroad must complete 45 of their final 75 hours in the College.) Except in special circumstances, and then only with the approval of the dean, at least 9 of the final 15 hours must be completed in residence.

Courses applicable to the degree taken while registered in any division of The George Washington University in the semester or summer sessions immediately prior to admission to degree candidacy in Columbian College are counted as courses in residence.

Advisory System

Students have the responsibility for determining their schedules and meeting degree requirements. Because faculty and staff advisors can help students learn to make well-informed choices, students are required to meet with an advisor prior to registering each semester. A CCAS advising hold prevents registration until students have consulted with their advisors.

Freshmen entering Columbian College participate in an advising system designed to provide students ready access to a knowledgeable member of the faculty. In this advising system, all freshmen must register for CCAS 1, the Freshman Advising Workshop; each section of the course is led by a faculty member who will serve as the students' academic advisor until they declare a major. CCAS 1 is required for all new freshmen; it will be graded, but only with the grades of *P* or *NP*; the course does not count toward the 120 credits required for the B.A., B.F.A., or B.S. or toward the 129 credits required for the B.Mus.

Once students declare their major, they will be advised by the faculty of their major department. Such faculty advising in the major will occur no later than the registration period during the student's fourth full-time semester or the semester following completion of 45 credit hours, whichever comes first. Transfer students without declared majors will receive advising from an advisor in the College's Student Services Center, while those with majors will be advised by their major department. Professional advisors are available year-round in the College's Student Services Center for academic assistance and for an accurate appraisal of procedural issues that may arise in any student's program of study.

In addition to the academic advising provided by the faculty and the College's professional staff, the peer advising system allows students to consult with advanced students who have been specially trained to help students make informed choices as they construct their schedules each semester. A directory of peer advisors is available from the Student Services Center.

Personal counseling is available through the office of the Dean of Students, the Counseling Center, Disability Support Services, the Multicultural Student Services Center, and the International Services Office.

Students having academic difficulty, especially freshmen who receive mid-semester warnings from their professors, should immediately consult with their professor or advisor in order to develop a plan for overcoming their problem. The Writing Center in the English Department and the Math Lab in the Mathematics Department both offer walk-in and by-appointment assistance; peer tutors and study skills workshops are available through the Counseling Center.

Academic Work Load

To encourage academic performance of high quality, the College limits the student's work load. After the freshman year, a full-time student who is not on probation may take a course load of up to 18 credit hours (the 18th and all subsequent hours require additional tuition charges). A full-time student who, during the immediately preceding semester, has received no grades below *B-* and

has earned grades of A or A- in three courses totaling at least 9 credit hours may take 21 hours. A student employed 20 or more hours per week should not attempt more than 10 credit hours per semester or 4 credit hours per summer session. The amount of academic work taken by a student on probation will be limited by the Student Appeals Committee.

Academic Standing

A student who is not suspended or on probation is considered to be in good standing. The following rules governing probation and suspension are applicable to students enrolled for a full-time program (12 credit hours or more) during the fall or spring semester. (Students enrolled for less than 12 credit hours during the fall or spring semester and students enrolled during the summer sessions are subject to probation or suspension on the basis of their cumulative record, a "semester" being considered a time interval in which at least 12 credit hours have accrued.)

Probation—A student whose cumulative grade-point average is less than 2.0 (but 1.0 or more) after attempting a minimum of 24 credit hours will be placed on probation. The course load of a student on probation shall be no more than 13 credit hours. Probation will be removed if, after a first or second semester on probation, the student's grade-point average is raised to 2.0 or more. A student still on probation after two semesters (or 24 additional credit hours attempted) ordinarily will be suspended but may be continued on probation by the Student Appeals Committee (see below).

Suspension—The following circumstances constitute grounds for suspension: (1) a cumulative grade-point average below 1.0 after attempting a minimum of 24 credit hours; (2) failure to attain a cumulative grade-point average of 2.0 or more after two successive semesters (or 24 additional credit hours attempted) on probation. The Student Appeals Committee may continue a student on probation (in lieu of suspension) if satisfactory progress is demonstrated during the probationary period and sufficient evidence of academic promise, by way of a statement of appeal, is offered by the student.

The minimum period of academic suspension is one fall or one spring semester. Final dates for applying for readmission are the same as those governing undergraduate admission (see Admissions). A suspended student seeking readmission must submit evidence to the Student Appeals Committee of conduct during absence from the University that indicates that the student will profit from readmission. A student suspended twice for poor scholarship will not be readmitted.

Semester Warning—A student whose cumulative grade-point average is less than 2.0 after attempting a minimum of 12 credit hours will be issued a warning notice at the end of the semester and will be required to take corrective measures (e.g., limitation of course load to no more than 13 credit hours).

Mid-semester Warning—When, at the end of the eighth week of each semester, instructors submit to the Student Services Center the names of freshmen who are doing unsatisfactory work, a notice of warning is sent to the student and a copy filed with the appropriate advisor. A warning constitutes notice to the student to consult the instructor and advisor at the earliest opportunity.

Dean's List and Dean's Commendation List

The name of any student who takes 15 credit hours or more of graded course work in any one semester and attains a semester grade-point average of 3.5 or more with no grades below B- will be placed on the Dean's List for that semester. A course taken on a Pass/No Pass basis beyond the 15-hour minimum of other courses does not affect the student's eligibility for the Dean's List, nor are the credit hours of such a course computed in the above figures. A grade of No Pass, however, disqualifies the student from the Dean's List.

The name of any part-time student who achieves a cumulative grade-point average of 3.5 or more upon completion of 30, 60, and 90 credit hours and upon graduation will be placed on the Dean's Commendation List.

Incompletes

Conditions under which the grade of *I* (Incomplete) may be assigned are described under University Regulations. A Columbian College undergraduate will only be granted a grade of *I* when a written contract has been made between the faculty member and the student.

Changing an Incomplete—Incomplete work must be completed no later than one calendar year from the last day of the examination period of the semester or summer session in which the grade of *I* was assigned. When work for the course is completed, the grade earned will be indicated in the form of *I*, followed by the grade. The indication of *I* cannot be removed from the transcript. A grade of *I* that is not changed within this period automatically becomes an *IF*. The grade of *I* cannot be changed by reregistering for the course here or by taking its equivalent elsewhere. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the dean for additional time in which to complete the work of the course. Such petitions should be submitted within a year of the assignment of the grade of *I*.

Pass/No Pass Option

A junior or senior student in Columbian College who is in good standing may, with the approval of the advisor and the dean, take one course a semester for a grade of *P*, Pass, or *NP*, No Pass. No student will be allowed to take more than four pass/no pass courses under this regulation. The student may, however, also receive grades of *P/NP* in preseminars for certain majors and in other courses normally using such grades. Under no circumstances may a student change from pass/no pass status to graded status, or vice versa, after the end of the eighth week of class. Courses required for the College's general curriculum requirements or in the student's major or minor field (including those courses required for the major that are offered by other departments) may not be taken on the pass/no pass basis. A transfer student may not choose this option until the second semester of enrollment in this University.

Earning an Additional Hour of Credit

Normally, no deviation is permitted from the number of hours of credit given in parentheses after the title of each course. In exceptional circumstances, however, and with the prior approval in writing of the instructor and the dean, a student may register for and earn an additional hour of credit in certain appropriate 100-level courses within the College by doing a significant amount of extra work as assigned and supervised by the instructor.

Tutorial Study

A junior or senior of demonstrated capacity, with a special interest in the subject matter of a regularly listed course, may be permitted to take tutorial study in residence under the personal direction of the instructor, in accordance with the rules of the appropriate department and with the approval of the dean. Credit under this plan is limited to the specific hours of credit designated for each course in the list of courses of instruction. It assumes frequent and regular conferences between the student and instructor.

Service-Learning Program

A maximum of 15 credit hours in Service-Learning Program courses may be credited toward bachelor's degrees in Columbian College.

Courses Outside Columbian College

No more than 18 credit hours of courses in schools of the University other than Columbian College may count toward the 120 credits required for graduation with a bachelor's degree in Columbian College. Pursuing a secondary field may increase the 18-hour limit, with permission of the dean.

No credit toward the degree is allowed for exercise and sport activities courses.

No more than 45 credit hours of courses completed by a student while in non-degree status in the Office of University Students may be applied toward a degree in Columbian College.

Naval Science—For information on naval science courses and the Naval Reserve Officers Training Corps, see Naval Science, under Courses of Instruction. Note that not all Naval Science courses count toward the 120 credit hours required for the degree.

Placement, Waiver, and Credit Examinations

Preliminary Placement Examinations

Some departments in Columbian College, including mathematics and all foreign languages, require students to take placement tests to determine level of proficiency or eligibility for specified courses. The student is placed in an appropriate course on the basis of these tests. There is no charge to the student for placement tests, and no credit (advanced standing) is awarded for courses bypassed or waived as a result of these tests.

English—Students whose scores indicate superior competence will be allowed to waive the Engl 10 requirement.

English as a Foreign Language—see Admissions.

Foreign Languages—A student who has not been granted advanced standing and who wishes to continue at GW the language begun in high school must take a placement examination, which is offered in Arabic, Chinese, French, German, Greek, Hebrew, Italian, Japanese, Korean, Latin, Russian, and Spanish. Upon completion of the examination, assignment is made to the appropriate course.

Mathematics—Students who wish to register in Math 20, 31, or 51 are required, prior to registration, to take a placement examination or to have achieved indicated scores on the SAT II in mathematics.

Earning Credit by Examination

Assuming there is no duplication of course credit earned, a maximum of 30 credit hours may be assigned for any combination of the following:

College Board Advanced Placement Tests—See Admissions. Credit may be granted for college-level courses taken in an approved secondary school if substantiated by satisfactory performance on the Advanced Placement Tests.

College Board College-Level Examination Program (CLEP)—See Admissions.

Special Departmental Examinations—A student may request any department of Columbian College to offer a special examination covering the subject matter of any specific course. The student must offer evidence of sufficient background to have a reasonable command of the subject matter. Departments reserve the right to deny such requests. Assigning credit by special departmental examinations will depend on the department's evaluation of the examination paper. These examinations will normally be of at least three hours' duration. A fee is charged for preparation, administration, and grading of each course examination.

Credit by special departmental examination is not permitted for the first two years of college-level courses in a native language other than English. A student who has previously taken examinations to waive course requirements may not subsequently take examinations for credit in the same courses.

Waiving Introductory Courses by Examination

Some departments in Columbian College, including English and History, offer periodic waiver examinations for introductory courses. Such examinations may be attempted at the option of the student; a fee is charged. Specific departments should be consulted for further details. Passing a waiver examination does not entitle a student to any credit toward the degree.

General Curriculum Requirements

With the exception of entering students in the College's School of Media and Public Affairs, all candidates for the degree of Bachelor of Arts or Bachelor of Science are admitted to a general arts and sciences curriculum until they declare a major field. Bachelor of Fine Arts and Bachelor of Music candidates are admitted directly into the departmental curriculum.

General curriculum requirements are established by the Arts and Sciences faculty as a whole and administered through its elected committees. Students must demonstrate that they have acquired familiarity with the breadth and diversity of the arts and sciences. Students will typically fulfill these requirements by taking the required number of GW courses in seven categories. Students may also fulfill these requirements in the following ways: (1) transfer credit for equivalent courses from an accredited institution; (2) credit earned by means of AP, IB, or other nationally approved examination programs; (3) or by waiver examinations such as SAT II or ACT subject tests, except in foreign languages. (See Advanced Standing and Advanced Placement under Admissions in this Bulletin.) The seven categories are listed below. No course may fulfill a requirement in more than one of the seven categories. The description of each category includes a rationale. Please consult the Student Services Center for a list of courses appropriate for freshmen.

1. Literacy—two courses (6 hours)

Students must take two courses in introductory English composition. For the academic world and beyond, students develop their ability to write effectively and to read with a high level of comprehension.

2. Quantitative and Logical Reasoning—two courses (6 hours)

Students must take two courses from the fields of mathematics, logic, and statistics. (Note that Math 3 is considered remedial and does not satisfy this requirement. Two statistics courses or two mathematics courses that are related in subject matter may not be taken; see the notes preceding the course lists under Statistics and under Mathematics in the Courses of Instruction section of this Bulletin.) Argumentation and quantitative evidence play important roles in social discourse. Students enhance their capacity to think logically and critically and to reason symbolically or with numerical data.

3. Natural Sciences—three laboratory courses (9–12 hours)

Students must take three courses with laboratories in at least two of the following fields: biology (including biological anthropology), chemistry, geology, and physics (including astronomy). The health, security, and economic well-being of our society are linked to a scientifically literate citizenry. Students explore the fundamental principles of the natural world and see how the tools of science—careful observation and experimentation—not only help develop technology but also lead to a deeper understanding of the universe.

4. Social and Behavioral Sciences—two courses (6 hours)

Students must take two courses in one or more of the following fields: anthropology (except biological anthropology), communication, economics, geography, linguistics, media and public affairs, political science, psychology, speech and hearing, and sociology (including human services). Structures and processes in society and personality shape public events and the behavior of individuals and groups. Students explore empirical results in the literature and the implications of these results for social and behavioral issues, thereby gaining an ap-

preciation for theory and methods of analysis, evidence, and proof in the social and behavioral sciences.

5. Creative and Performing Arts—(3 hours)

Students must take three credits in one of the following fields: fine arts, creative writing, dance performance, electronic media performance, applied music (jazz performance, a single instrument, or a single ensemble), and theatre performance. Imagination and its expression play an important part in the cultural life of a society. Through courses that require participation in a creative or performing art, students gain insight into the interactions among materials, talent, and imagination, and develop sensitivity to the diverse elements involved in the arts.

6. Humanities—four courses (12 hours)

Students must take four courses in at least two of the following fields: American studies, classical studies, literatures in English, foreign literatures in their original language and in translation, history (including the history and appreciation of art, dance, music, and theatre), humanities, philosophy (except logic), religion, and women's studies. The humanities express the ideas, aspirations, and values of individuals and the societies in which they live. Through courses in the humanities, students experience the richness of ideas, traditions, and stories that have shaped the world.

7. Foreign Languages and Cultures—two courses (6–8 hours)

Students must take two courses in one language other than English, beginning at the level at which they place, or students must take two courses in aspects of foreign cultures from the fields of anthropology, art history, classical and Semitic languages and literatures, East Asian languages and literatures, German and Slavic languages and literatures, geography, history, humanities, international affairs, music, political science, religion, and women's studies. In our increasingly multicultural society, familiarity with a second language or another culture is important to understanding ourselves in relation to the world. Students must study a second language or other cultures in order to help develop this understanding, to facilitate communication across cultural and national boundaries, and to gain an appreciation for cultural diversity. For those who choose the foreign cultures option, courses must be selected from the following: Anth 170 to 175, 177 to 179, 185, 186; Clas 71, 72, 81, 82, 100, 101, 115, 117 to 120; Chin 136, 161, 163, 164; Japn 111, 112, 162; Kor 111, 112; AH 101, 102, 104, 105, 112 to 114, 119, 121, 122, 147, 155, 187, 188; Geog 154, 161, 164, 165; Ger 91, 92, 161, 162, 165; Slav 91, 92, 151, 152, 161, 162, 165, 166, 185, 186; Hist 107 to 115, 118, 131, 132, 141 to 146, 148, 149, 158, 159, 161 to 165, 187, 189, 190, 193 to 196; Mus 7; PSc 130, 131, 170, 173, 176, 177, 179 to 181, 183; Rel 106, 107, 112, 113, 115, 157 to 161, 163 to 165, 771; WStu 136. The Student Services Center will periodically update the list of approved courses.

The Major

In order to declare a major, all students must receive academic guidance from a faculty advisor in the major-field department and submit a Declaration of Major form, signed by the major-field advisor, to the Student Services Center. The Declaration of Major form must be submitted no later than the registration period during the student's fourth full-time semester or the semester following the completion of 45 credit hours (whichever comes first). No student is considered to have declared a major until this process is completed. Thereafter, the student receives academic guidance from a faculty advisor in the major-field department. In most cases, filing of the approved declaration form assures the student of admission to the major declared; however, if space, equipment, or other requirements compel a department or major program to limit the number of students in that major, admission to the major may be on a selective or space-available basis. Majors that require admission are communication, electronic media, journalism, and political communication. Once students declare their

major, they must receive academic guidance from a faculty advisor in the major field in order to register for all subsequent semesters.

A change in degree candidacy within Columbian College (e.g., from Bachelor of Arts to Bachelor of Science) requires the permission of the dean. The degree requirements effective at the time the change is approved must be met.

Major Fields

All fields listed below (except Applied Mathematics, Environmental Science, and Statistics) may lead to the Bachelor of Arts degree; a Bachelor of Science degree may be elected in those fields indicated by an asterisk.

American Studies	*Geoscience
Anthropology	German Language and Literature
*Applied Mathematics	History
Archaeology	Human Services
Art History	Japanese Language and Literature
Art History and Fine Arts	Journalism
*Biology	Judaic Studies
*Chemistry	Mathematics
Chinese Language and Literature	Music
Classical Humanities	Philosophy
Communication	*Physics
Criminal Justice	Political Communication
Dance	Political Science
Dramatic Literature	Program in the Liberal Arts
Early Modern European Studies	Psychology
*Economics	Religion
Electronic Media	Russian Language and Literature
English	Sociology
English and Creative Writing	Spanish-American Literature
*Environmental Science	Spanish Language and Literature
Environmental Studies	Speech and Hearing Science
Fine Arts	*Statistics
French Language and Literature	Theatre
Geography	Women's Studies

Scholarship Performance in the Major

Majors are defined in terms of credit hours, required courses, and the attainment of grades no lower than C- in the minimum number of 100-level courses required in the major field. If a student receives a grade of D+, D, or D- in a 100-level course specifically required in the major, the major department or program may permit the course to satisfy a curricular requirement even though it would not normally count toward the minimum number of hours required for the major. However, the department or program may instead require the student to repeat the course until a satisfactory grade (C- or better) is earned. (The department chair or program director must authorize such repetition in a memo to the Student Services Center before the student may register a second time.) Once the student has completed the course with a satisfactory grade, credit hours earned the first time the course was taken will count toward the minimum number of hours required in the major. Credit earned for the repetition will not count toward the degree. The minimum specific requirements for majors are listed under the department concerned in Courses of Instruction. The chair of the department, or designated departmental advisor, should be consulted before registration concerning the student's program of courses; the entire program, including electives, must be approved by the department. The student is also

expected to consult a departmental advisor in all matters affecting the program of studies, such as changes, substitutions, or withdrawals.

Some majors require satisfactory completion of entry, proficiency, or concluding examinations in addition to courses.

Double Majors

A student who completes the requirements of two major fields in Columbian College (for example, mathematics and physics, or history and economics) may graduate with a double major. Such a student should consult with advisors in the two departments concerned and officially declare both majors on the Declaration of Major form available in the Student Services Center. A Columbian College student may pursue two majors at the same time, even though one is toward a B.A. and the other is toward a B.S. A major field in Columbian College cannot be combined with a major field offered by another degree-granting unit of the University, with the exception of the Elliott School of International Affairs and the School of Engineering and Applied Science.

A Columbian College student (whether in a B.A. or B.S. program) may pursue a second major in the Elliott School of International Affairs or the School of Engineering and Applied Science, provided that permission to do so has been obtained from the appropriate administrative office of the Elliott School or SEAS. Students in the Elliott School or SEAS may also take a second major (but only toward a B.A. and excluding majors in communication, electronic media, journalism, and political communication) in Columbian College. Students wishing to pursue this option must request approval through the appropriate department and the Columbian College's Student Services Center. In all cases, students must complete the major in their own school in order to graduate. A second major in the Elliott School or SEAS may supplement the Columbian College major but may not substitute for it.

Interdisciplinary Programs

Regular Interdisciplinary Programs—Programs include Archaeology, Early Modern European Studies, Environmental Science, Environmental Studies, Judaic Studies, and Political Communication.

Special Interdisciplinary Programs—Students who find no existing major or program suited to their individual educational goals may propose a special interdisciplinary major program, in consultation with appropriate departmental advisors. Only programs with valid and clearly defined academic goals will be considered for approval.

Students with above-average records (a *B* average or better) are eligible for such programs. Normally, the proposed program of study must be submitted for approval by the end of the first semester of the junior year.

Approval of the proposed program rests with the Student Appeals Committee, which must also approve the proposed name of the program and the composition of the committee that will oversee it. At least 45 credit hours of the program must be completed in Columbian College. Because of the broad scope of an interdisciplinary program, it may not be part of a double major.

At the discretion of the committee overseeing the program, the student must either write an acceptable senior thesis or pass a comprehensive examination in the last semester of study toward the degree.

Program in the Liberal Arts—This program is designed to provide a general education in the liberal arts, with or without another major, as the student chooses. It offers opportunity for achieving a substantial acquaintance with each of the three divisions of knowledge through a selection of courses that cultivate a broad perspective in time and in national and/or cultural traditions. For curriculum requirements, see Liberal Arts, under Courses of Instruction.

Minors and Secondary Fields

Minors

Students who wish to familiarize themselves with a field outside their major may graduate with a minor in addition to the major. Not all Columbian College departments offer undergraduate minors; the requirements prescribed by those that do are listed under the department concerned. A student interested in a minor should consult a faculty advisor in the department concerned and declare both major and minor programs on the Declaration of Major form available in the Student Services Center.

At least one-half of the course work required for a minor must be done in residence. Grades of *C-* or better must be earned in 100-level courses, including such courses transferred as advanced standing from another institution. Courses passed with a grade below *C-* may be used to fulfill a minor field curricular requirement but may not be counted toward the total number of credit hours required for the minor.

When taken by a student enrolled at the University in a school other than Columbian College, such minors are designated secondary fields. The same curricular and scholarship requirements apply to secondary fields as to minors.

Undergraduates in other schools of the University may pursue major requirements to earn a secondary field when there is no appropriate minor.

Minors are available in the following fields:

Africana Studies	German Language and Literature
American Studies	History
Applied Ethics	Human Services
Archaeology	Italian Language and Literature
Art History	Japanese Language and Literature
Art History and Fine Arts	Jazz Studies
Biological Anthropology	Journalism
Biology	Judaic Studies
Chemistry	Korean Language and Literature
Chinese Language and Literature	Linguistics
Classical Humanities	Mathematics
Communication	Music
Creative Writing	Peace Studies
Criminal Justice	Philosophy
Cross-Cultural Communication	Physics
Dance	Political Science
Early Modern European Studies	Psychology
Economics	Religion
Electronic Media	Russian Language and Literature
English	Sociocultural Anthropology
Film Studies	Sociology
Fine Arts	Spanish Language and Literature
French Language and Literature	Speech and Hearing
General Anthropology	Statistics
Geography	Theatre
Geoscience	Women's Studies

Secondary Fields

Just as students enrolled at the University but outside the College may pursue Columbian College minors as secondary fields, such study is permitted Columbian College students in other schools of the University. Secondary fields are available in the School of Engineering and Applied Science, the School of Business and Public Management, the School of Medicine and Health Sciences, the School of Public Health and Health Services, and the Elliott School of International Affairs. Columbian College students are limited in the number

of hours they may take in courses outside the College (so-called "professional credit" courses). Refer to *Courses Outside Columbian College*, above.

Preparation for Medical School

A student who plans to apply to medical school fulfills the general requirements of Columbian College stated above and may select any major-field curriculum of any Columbian College department. Advice about academic preparation for medical school is provided by the Student Services Center. For admission to most medical schools, the student must have a minimum of 90 credit hours applicable toward a degree in an approved college of arts and sciences; the 90 hours must include:

Biology—8 credit hours, including laboratory. This may be either in general biology or zoology but may not include separately credited courses in botany.

Chemistry—8 credit hours of general inorganic chemistry (which may include qualitative analysis), including laboratory, and 8 credit hours of organic chemistry, including 2 hours of laboratory.

Physics—8 credit hours, including laboratory.

English—6 credit hours in the usual introductory English composition courses or their equivalents.

Many medical schools have additional entrance requirements, which may include courses in biochemistry, genetics, and mathematics. Even when such courses are not required, they are strongly recommended.

With the exception of these specific requirements, applicants are urged to follow their personal interests in developing their course of study. A well-balanced program, rather than a specific field, is the criterion by which an applicant is judged. It is not advisable to take courses that appear to cover subject matter in the medical program. Although well-qualified candidates are eligible for admission after completing the minimum 90-credit-hour requirement, the majority of applicants are found to be better prepared for the study of medicine after four years of college work.

Integrated Bachelor of Arts/Doctor of Medicine

In addition to the early selection program described under the School of Medicine and Health Sciences, the University offers a seven-year integrated B.A./M.D. program. The program has been designed for honors students of high ability and maturity who have decided, before applying to college, that they wish to become physicians and want to accomplish that goal in a shorter amount of time and at a lower overall cost than is usual. Detailed information on this program is available through the College.

Preparation for Law School

Because a broad liberal education is the best undergraduate preparation for law school, Columbian College does not prescribe a prelegal curriculum. Advice about academic preparation for law school is provided by the Student Services Center.

Second Bachelor's Degree

Columbian College graduates who wish to receive a second bachelor's degree following graduation must satisfy the general College requirements and the requirements of their new major and degree and must complete 30 hours in residence in Columbian College. Students with undergraduate degrees from other institutions or from other divisions of the University, if admitted to the College, must meet the same set of requirements.

SCHOOL OF BUSINESS AND PUBLIC MANAGEMENT

Dean S. Phillips

Senior Associate Dean D.J. Lenn

Associate Deans J.W. Cook, D.R. Sheldon

Organized as the School of Government in 1928, the School of Business and Public Management has been responsible for over half a century for the professional development of individuals assuming leadership roles in society. The School comprises eight departments—Accountancy, Finance, International Business, Management Science, Marketing, Public Administration, Strategic Management and Public Policy, and Tourism and Hospitality Management. The use of a multidisciplinary approach in educational programming helps prepare both the generalist and specialist for professional careers in today's complex, organizational society.

The School of Business and Public Management is a member of AACSB International—The Association to Advance Collegiate Schools of Business, and its Bachelor of Business Administration and Bachelor of Accountancy programs are accredited by the Association.

Mission Statement—We believe that the creation and dissemination of knowledge is essential for effective management. Our mission is to serve current and future leaders, managers, and professionals in the global community by offering superior learning opportunities in business and public management; engaging in research and other scholarly activities to advance management theory and practice; and providing management and professional expertise to business, government, and not-for-profit organizations.

We are guided by our commitment to excellence in teaching and life-long learning; excellence in research and creation of new knowledge; meeting the distinctive needs of both part-time and full-time students; promotion of an entrepreneurial spirit; intellectual and professional development of faculty and staff; diversity in students, faculty, and staff; emphasis on the interaction of public-sector and private-sector organizations; and active engagement in the public discourse about the social and ethical responsibility of business.

As active and responsible citizens of our local community, the nation's capital, we acknowledge our reliance upon its wealth of resources and our commitment to help shape its future.

The Bachelor's Degrees

The School offers programs leading to the degrees of Bachelor of Accountancy and Bachelor of Business Administration. Programs leading to the degrees of Bachelor of Accountancy and Bachelor of Business Administration include foundation knowledge for business in accounting, behavioral science, economics, mathematics, and statistics. Curricula are designed to provide perspectives on ethical and global issues, the influence of political, social, legal and regulatory, environmental, and technological issues, and the impact of demographic diversity on organizations.

Several of the required core business courses are structured as modules lasting less than a full semester. This is done to increase program flexibility, while ensuring that key concepts are covered.

A Bachelor of Business Administration student selects a field of concentration from among business economics and public policy, finance, human resource management, information systems, international business, marketing, tourism and hospitality management, or, with faculty approval, may choose to structure an individualized field of concentration reflecting the student's specific interests in management.

Degree Requirements

Academic Work Load

A full-time student in good standing (2.0 overall grade-point average or higher) may register for a maximum of 15 credit hours each semester and 6 hours each summer session. A student employed more than 20 hours a week, who is in good standing, may not take more than 9 credit hours each semester and 3 hours each summer session. A full-time student on probation may take no more than 12 credit hours of course work. It is strongly recommended that a student on probation not be employed.

A full-time student whose overall grade-point average is 3.5 or higher may take up to 18 credit hours. A student employed more than 20 hours a week, whose grade-point average is 3.5 or higher, may take up to 12 credit hours.

A student who accepts employment after registration or at any time during a semester must report immediately to the director of the Advising Center so that the program may be adjusted if necessary.

Exceptions to these rules require the approval of the director of the Advising Center.

Scholarship Requirements

A student must have the following to graduate: (1) an overall grade-point average of at least 2.0 and (2) a grade-point average of at least 2.0 in all required 100-level B.B.A. or B.Accy. courses and field-of-instruction-related courses. All courses taken at The George Washington University are included in the *overall grade-point average* calculation. Elective courses in or out of the School of Business and Public Management cannot be used as substitutes for required courses in the calculation of the *major field grade-point average*.

Dean's Honor List

The names of students who achieve a grade-point average of 3.5 or higher are placed on the Dean's Honor List for that semester. Appearance on the list is limited to (1) full-time students registered for a minimum of 12 credit hours (provided that the 12 hours are taken for a grade) and (2) part-time students registered for a minimum of 12 credit hours over a period of two consecutive semesters, which may include a summer term.

Incompletes

Conditions under which the grade of *I* (Incomplete) is assigned are described under University Regulations. The grade of *I* must be changed by a date agreed on by the instructor and the student but no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An Incomplete that is not changed within this period automatically becomes an *IF*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the director of the Advising Center for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be changed by reregistering for the course here or by taking its equivalent elsewhere. The *I* notation remains on the student's permanent record even after the course has been successfully completed.

Semester Warning

Any student whose overall or major grade-point average falls between 2.0 and 2.2 will be placed on warning. Though the student's courses will not be re-

stricted, progress during the semester will be monitored. Students are required to meet with an assigned advisor during the semester.

Mid-Semester Warning

If a professor files an evaluation showing that a student is doing unsatisfactory work (C- or below), the director of the Advising Center will inform the student in writing of his or her status. This notice constitutes an official direction to consult with the professor and advisor immediately.

Probation

A student whose grade-point average (either overall or in the major field) falls below 2.0 after completing a minimum of 12 credit hours of study will be placed on probation. Probation by overall grade-point average normally extends over the period in which the student attempts another 12 credit hours of work, which may include remedial studies as prescribed. In those cases in which a student chooses to take a lighter load during the probationary semester, performance will be reviewed at the end of the semester and the student may be suspended at that time. Incomplete grades are not allowed during the probation period. Probation by major field normally extends over the period in which the student attempts 6 credit hours of study in major field course work.

Suspension

A student whose grade-point average (either overall or in the major field) is 1.5 or below in any semester or remains below 2.0 at the end of the probationary period will be suspended. Any outstanding Incomplete grade at the time of suspension must be completed or will turn to an administrative F. A student suspended for poor scholarship may apply for readmission after the end of the fall or spring semester following the date of suspension. To be considered for readmission, the student must submit evidence of remedial activity performed during the suspension period and evidence of renewed potential ability to do college-level work. No advanced standing will be assigned for academic work completed while the student is suspended, but the student may petition the director of the Advising Center for consideration of advanced standing after completing a minimum of 12 credit hours of course work here and achieving a cumulative and major field grade-point average of at least 2.0.

A student readmitted after suspension is on probation (see above) and must maintain a current grade-point average determined by the director of the Advising Center until the cumulative and major field grade-point average are at least 2.0. In no case will the overall probationary period after readmission exceed 24 credit hours of study or the major field probationary period exceed 12 credit hours of study. A student suspended twice for poor scholarship will not be readmitted.

Pass/No Pass Option

A junior or senior student who has a cumulative grade-point average of 2.5 or better may, with the approval of the advisor and the director of the Advising Center, take one upper-level non-business elective a semester and receive a grade of P, Pass, or NP, No Pass, which will be recorded on the student's transcript but will not be reflected in the grade-point average. No student will be allowed to take more than four pass/no pass courses, with a limit of one per semester. Under no circumstances may a student change from pass/no pass status to graded status, or vice versa, after the last date to drop a course (except in the case of a prerequisite to Math 51). Required courses may not be taken on the pass/no pass basis. A transfer student may not choose this option until the second semester of enrollment in the University.

Grade of F

A grade of *F* earned in a required or elective course remains a part of the student's record and is calculated into the grade-point average, even after the course is retaken.

Residence

A minimum of 30 credit hours, including at least 27 credit hours in required business or accountancy courses, must be completed while registered in the **School of Business and Public Management**. This requirement applies to students transferring within the University as well as to students transferring from other institutions. Unless special permission is granted by the director of the Advising Center to pursue work elsewhere, the work of the senior or final year must be completed in the School of Business and Public Management. Students who have successfully completed 60 credit hours at GW may not take summer courses at a community college.

Independent Research Plan

A junior or senior of demonstrated capacity, with a special interest in the subject matter of a course, may be permitted to undertake study under the personal direction of a regular, full-time member of the faculty, in accordance with the rules of the appropriate department. Credit under this plan is limited to the specific credit hours normally allowed when a course is taken on a class basis. A petition outlining the student's specific study plan must be submitted to the director of the Advising Center prior to beginning any independent study. Generally, a maximum of two independent studies in two separate semesters is permitted.

Earning Credit or Waiving Requirements by Examination

A student may earn credit up to a maximum of 30 credit hours or waive curricular requirements by performing satisfactorily on the following tests:

College-Level Examination Program (CLEP)—See Admissions for general information on the CLEP tests. CLEP tests in Introduction to Business, Commercial Law, and Data Processing are limited to 1.5 credits each of advanced standing. CLEP tests in general mathematics, college algebra/trigonometry, English composition, and more advanced courses in accounting and business administration are not accepted for advanced standing. Matriculated students who wish to receive credit for CLEP General and Subject Examinations must receive prior approval, through petition, of their advisor and the director of the Advising Center.

Advanced Placement Tests and Achievement Tests—See Admissions.

Special Departmental Examinations—A student may request any department of Columbian College to offer a special examination covering the subject matter of any specific course. (If an appropriate CLEP Subject Examination is available, the department may choose to employ it.) The student must offer evidence of sufficient background to have a reasonable command of the subject matter. Departments reserve the right to deny such requests. Credit by special departmental examination is not permitted for the first two years of college-level courses in a native language other than English. A student who has previously taken examinations to waive course requirements may not subsequently take examinations for credit in the same courses. Assigning credit (or waiving a requirement) by special departmental examinations will depend on the department's evaluation of the examination paper. These examinations will normally be of at least three hours' duration. A fee for each course examination is charged for preparation, administration, and grading of the examination. A petition must be submitted to the director of the Advising Center prior to taking the examination.

Waiving Introductory Courses by Examination—Several departments in Columbian College, including English and history, offer periodic waiver examinations for introductory courses. Such examinations may be attempted at the option of the student; a fee is charged. Specific departments should be consulted for further details. Passing a waiver examination does not entitle a student to any credit toward the degree.

The Bachelor of Accountancy

The principal objective of the Bachelor of Accountancy degree is preparation for a professional career in accounting. Professional preparation requires specialization in accounting knowledge as well as a general education in English, humanities, social sciences, mathematics, and sciences. An additional objective is the preparation of students for a fifth-year or Master of Accountancy program that is intended to meet the academic needs of students seeking professional accounting careers in the public or private sector, which demand high entry-level academic achievement.

One hundred twenty credit hours are required for graduation. To be accepted in the Bachelor of Accountancy program a cumulative grade-point average of 2.5 or higher is required at the start of the junior year. Courses must be taken in accordance with the academic status of the student (i.e., freshman, sophomore, junior, senior) and the course prerequisites. Math 3, 6, 9, 10, 20 (without 21), and ExSA courses may not be used for credit toward the Bachelor of Accountancy.

Curriculum for the Pre-Accountancy Program

Freshman Year—BAdm 1-2, 66; Econ 11-12; Engl 9 or 10, 11; Math 31-32 or 51-52; a two-course sequence chosen from Astr 1-2, BiSc 3-4 or 13-14, Chem 3-4 or 11-12, EES 1-2, Phys 1-2; one approved elective focusing on a culture or political system other than one's own.

Sophomore Year—Accy 51, 52; BAdm 53, 55, 64; Stat 51 or 53; one elective selected with advisor approval to improve communication skills; one course on moral reasoning selected with advisor approval; three 3-credit restricted electives chosen in consultation with the advisor, at least one of which is in the humanities.

Curriculum for the Accountancy Program

Junior Year—Accy 121, 122, 151, 161, 192; BAdm 110, 115; three approved 3-credit electives, of which two are chosen outside of SBPM departments.

Senior Year—Accy 171, 181, 193, 196; BAdm 150, 197 (BAdm 197 must be taken at GW); one 3-credit 100-level elective chosen from the Department of International Business; one approved 3-credit 100-level non-accountancy elective chosen from SBPM departments; two approved 3-credit 100-level electives chosen outside of SBPM departments.

The Bachelor of Business Administration

A minimum of 120 credit hours of course work are required for graduation. To be recommended by the Faculty for graduation, candidates are required to complete, in addition to the appropriate freshman and sophomore work, a minimum of 60 credit hours of course work in the junior and senior years, including the required course work in one of the fields of concentration offered by the School. Courses must be taken in accordance with the academic status of the student (i.e., freshman, sophomore, junior, senior) and the course prerequisites. The field of concentration must be selected no later than the first semester of the junior year. Electives in the junior and senior years are restricted to appropriate

100-level courses chosen in consultation with the advisor. Math 3, 6, 9, 10, 20 (without 21), and ExSA courses may not be used for credit toward the B.B.A. degree. If the student places in the first semester of a language previously studied in high school, credit toward the degree will not be granted; however, the second semester of a first-year language course that was studied in high school may be taken as a sophomore elective.

Curriculum for the First Two Years for All B.B.A. Students

The key to abbreviations for course designations can be found at the beginning of the Courses of Instruction section.

Freshman Year—BAdm 1-2, 66; Econ 11-12; Engl 9 or 10, 11; Math 31-32 or 51-52; a two-course sequence chosen from Astr 1-2; BiSc 3-4 or 13-14, Chem 3-4 or 11-12, EES 1-2, Phys 1-2; one approved elective focusing on a culture or political system other than one's own.

Sophomore Year—BAdm 51, 52, 53, 55, and 64; Stat 51 or 53; one elective selected with advisor approval to improve communication skills; one course on moral reasoning selected with advisor approval; three 3-credit restricted electives chosen in consultation with the advisor, at least one of which is in the humanities.

Curriculum for the Second Two Years for All B.B.A. Students

The Bachelor of Business Administration program is designed to provide the broad foundation required for eventual leadership in either business or governmental administration. The business administration major consists of 30 credit hours of required upper-level business administration courses and 15 hours of required field-related courses. These are included in the calculation of the major grade-point average.

Junior Year—BAdm 110, 115, 120, 130; one analytical tools course and one approved field tools course; one course chosen in the field of concentration; three approved 3-credit 100-level electives chosen in consultation with the advisor (two restricted, one unrestricted).

Senior Year—BAdm 145, 150, 197, and a section of BAdm 190 approved by the advisor; three courses selected from the field of concentration; one field-related elective; three approved 3-credit 100-level electives chosen in consultation with the advisor (two restricted, one unrestricted).

Fields of Concentration

The field of concentration consists of four field courses and an elective designated by field faculty. The field must be selected no later than the first semester of the junior year; the student should contact the Advising Center to declare a field. Students may declare two fields, but they should note that this will increase the number of credit hours required to complete the B.B.A. In addition to maintaining the current advisor, the student is assigned a faculty mentor. Fields are listed below, followed by required and elective courses that constitute the field (an asterisk indicates that the course is required for the field).

Business Economics and Public Policy—Mgt 117; IBus 171; Econ 101*, 102*, 136, 158, 159, 161, 162, 181-82; Hist 179; PSc 116, 117, 118, 122; PAd 125; Soc 168. The field-related elective must be chosen from IBus 160 or PSc 104.

Finance—Fina 122*, 123*, 124*, and either 132 or 135. The field-related elective must be chosen from Accy 121, 161; Econ 121, 123, 181; IBus 171, 173.

Human Resource Management—Mgt 115*, 116*, 117*, and one course from among Comm 120, 150, or 170; Econ 165; Mgt 251, 252, 257, 259; Psyc 131 or 144. The field-related elective must be chosen from IBus 160, PAd 125, or Mgt 107 or 192.

Information Systems—Mgt 119,* 120,* 121,* and either 123 or 243. The field-related elective must be chosen from Mgt 107, 110, 115, 190, 231; Stat 130; or other courses with permission of faculty advisor.

International Business—IBus 160,* 166,* and 171,* one course from among IBus 168, 173, or 175. The field-related elective must be chosen from Accy 121; Econ 151, 181, 182; Fina 123; Mktg 142, 143, 148; Stat 118.

Marketing—Mktg 142,* 143,* 150,* 159.* The field-related elective must be chosen from AmSt 167; Comm 150; Geog 145; IBus 160, 166, 168; PCm 150; TStd 145.

Tourism and Hospitality Management—TStd 104,* 143,* 144,* and 145.* The field-related elective must be chosen from Mktg 142, 143, or 148.

Individualized Field of Concentration—A student with a specific interest in some field of management may design an individualized field of concentration drawing on courses across the University. Past examples of approved individualized fields include sport management, media management, and arts management. Such a concentration consists of four courses plus a field elective selected with the guidance of faculty with expertise in the area of interest. All such individualized fields must be approved in advance through the School's Office of Undergraduate Programs. Interested students should discuss their ideas with an advisor.

Secondary Field of Study

A secondary field of study in business administration is available in the School of Business and Public Management; SBPM students may pursue a secondary field in other GW schools. See the brochure "Secondary Fields of Study," available in the Advising Center.

Students from Other Schools Within the University

Degree candidates from other schools of the University cannot register for more than 21 hours of credit in courses from the Bachelor of Business Administration degree program. Typically, a maximum of 6 hours of credit is permitted in courses from the Bachelor of Accountancy program, unless an advisor recommends an additional 3 credit hours.

Five-Year Programs Leading to a B.B.A. and a Master's Degree

The School of Business and Public Management offers five-year programs leading to both a B.B.A. and a master's degree. Students enrolled in five-year programs leading to both a B.B.A. and a master's degree are enrolled in courses at both the undergraduate and graduate levels during the final two years. In each case, the student must be admitted to the graduate program in the fourth year of study, after completion of between 75 and 90 credit hours. During the last two years, the student simultaneously completes requirements for the undergraduate and the graduate degree but is not considered a graduate student until the start of the fifth year of study. The two degrees are awarded concurrently; there are no exceptions. Students who choose to discontinue the program at the end of four years will be required to take additional courses to complete requirements for the B.B.A. A full description of the programs can be obtained through the Advising Center.

Bachelor of Business Administration/Master of Public Administration

A student may apply for admission to the Master of Public Administration after completion of 75 credit hours. Upon acceptance, during the fourth and fifth year of study, the student works simultaneously toward both degree programs; both the Bachelor of Business Administration and the Master of Public Administration are awarded at the successful completion of all requirements for both degrees, usually at the conclusion of the five years of study.

Curriculum requirements in the first six semesters are identical to those of the B.B.A. degree. Students take PAD 125 among the third-year choices.

Fourth Year—BAdm 145, 150, 197; a section of BAdm 190 approved by the advisor; PAD 201, 202, 203, 204; two upper-level non-business electives.

Fifth Year—PAD 205, 206, 208, 209; three courses in one of the M.P.A. fields of concentration (including budget and public finance; federal policy, politics, and management; managing in public organizations; managing state and local governments; policy analysis and evaluation); three elective courses in public administration.

Bachelor of Business Administration/ Master of Science in Information Systems Technology

After completion of 75 credit hours, a student may apply for admission to the Master of Science in Information Systems Technology with a field of concentration in information systems development. Upon acceptance, the student works simultaneously toward both degree programs; the Bachelor of Business Administration and Master of Science in Information Systems Technology are awarded at the successful completion of all requirements for both degrees, usually at the conclusion of five years of study.

Curriculum requirements in the first six semesters are identical to those of the B.B.A. degree. Students take Mgt 119 and 121 among the third-year choices.

Fourth Year—BAdm 145, 150, 197; a section of BAdm 190 approved by the advisor; two upper-level non-business electives: Mgt 120, 280, 282, 284; one graduate elective selected with advisor approval.

Fifth Year—Mgt 287, 298; four field electives chosen from other M.S.I.S.T. courses; one graduate elective selected with advisor's approval.

Bachelor of Business Administration/Master of Tourism Administration

After completion of 75 credit hours, the student may apply for admission to the Master of Tourism Administration. Upon acceptance, during the fourth and fifth years of study, the student works simultaneously toward both degree programs; the Bachelor of Business Administration and Master of Tourism Administration are awarded at the successful completion of all requirements for both degrees, usually at the conclusion of five years of study.

Students choose one of four established concentrations or, with faculty approval, design an individualized field at the master's level to suit a specific career objective. Students are required to gain at least 500 hours of work experience in the tourism and hospitality field if they do not have equivalent previous experience.

Curriculum requirements in the first six semesters are identical to those of the B.B.A. degree. Students take TStd 104 and 143 among the third-year choices.

Fourth Year—BAdm 145, 150, 197; a section of BAdm 190 approved by the advisor; TStd 144, 145, 249, 250, 270; two approved upper-level nonbusiness electives; and one undergraduate-level TStd course selected with advisor's approval.

Fifth Year—12 credit hours in one of the following concentration fields: destination management, travel marketing, event management, sport management, or the individualized study option; plus 12 credit hours in approved electives and either TStd 283 and 297 or TStd 299 and 300.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Dean T.W. Tong

Associate Dean R.S. Heller

The School of Engineering and Applied Science was organized in 1884 as the Corcoran Scientific School of Columbian University. It was named in honor of William W. Corcoran, president of the University's Board of Trustees from 1869 to 1888. The school was among the first to accept women for degree candidacy in engineering. The organization and offerings of the school have evolved over the years, but throughout most of its history the program has been characterized by its emphasis on the principles guiding the advancement of technology.

Through its five departments—Civil and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Engineering Management and Systems Engineering; and Mechanical and Aerospace Engineering—the School of Engineering and Applied Science offers undergraduate study leading to the degrees of Bachelor of Science (Civil Engineering), Bachelor of Science (Computer Engineering), Bachelor of Science (Computer Science), Bachelor of Science (Electrical Engineering), Bachelor of Science (Mechanical Engineering), Bachelor of Science (Systems Engineering), and Bachelor of Arts in Applied Science and Technology and in Computer Science. Five-year bachelor's/master's degree programs are available for selected majors. In cooperation with the Law School, an integrated engineering and law program leading to the degrees of Bachelor of Science or Arts and Juris Doctor is offered. An integrated engineering and medicine program leading to the degrees of Bachelor of Science or Arts and Doctor of Medicine is offered in cooperation with the School of Medicine and Health Sciences. The School offers graduate study leading to the degrees of Master of Science, Master of Engineering Management, and Doctor of Science and to the professional degrees of Engineer and Applied Scientist.

The School of Engineering and Applied Science maintains extensive and varied computing facilities as well as an array of laboratory facilities to support study and research in such areas as general-purpose electronics, computer science, computer engineering, graphics, computer-aided design, robotics and computer-aided manufacturing, computer-aided engineering, artificial intelligence, software engineering, decision support systems, interactive multimedia, power systems, control systems, medical engineering, combustion diagnostics, fluid mechanics and hydraulics, environmental engineering, propulsion, soil mechanics, thermal sciences and instrumentation, materials science and engineering, thin-film development, and communications, microwaves, and lasers.

SEAS Regulations

Academic Work Load

A full-time undergraduate student who is not on probation may register for no more than 21 credit hours. Students on probation may not register for more than 12 credit hours. A student employed more than 24 hours a week may take no more than 10 credit hours. In exceptional cases these limits may be exceeded with the advisor's permission.

Credit by Examination

Assuming there is no duplication of course work, a maximum of 30 credit hours may be assigned upon admission to the University for any combination of the following.

College Board Advanced Placement (AP) Tests—See Admissions.

College Board College-Level Examination Program (CLEP)—See Admissions.

A student already registered at the University must seek departmental approval before taking a CLEP Subject Examination for credit. Credit may not be earned

by passing the examination after having taken the equivalent course or after having taken a waiver examination for the course.

Department Examinations for Waiver or Credit—Registered SEAS students may also take examinations in some academic departments for waiver of or credit for a specific course upon approval of the appropriate department chair; before the test is administered, the student must have demonstrated sufficient preparation to warrant being given the test. An examination for credit is not allowed if an examination for waiver has been successfully completed or if the student has taken the course.

Makeup of Credit for Waived Courses

Waiver of a required course requires approval of the student's faculty advisor and curriculum coordinator. If a course required by the SEAS curriculum is waived, the corresponding credit hours must be earned by satisfactory completion of a university-level academic course, either technical or nontechnical, approved by the student's faculty advisor. If the substituted course would normally be considered part of the student's curriculum, the grade earned will be used in determining grade-point average, Dean's List, probation, and suspension. If the substituted course would not be part of the student's curriculum, the grade will not be included in the above computations.

Scholarship Requirements

To be eligible for graduation a student must have (1) a grade-point average of at least 2.2 for technical courses in the fifth through eighth semesters of the curriculum and (2) a 2.0 overall average for the program taken at SEAS. All computer science courses taken in the Bachelor of Arts in Computer Science are considered technical for this purpose. Grades used to calculate the grade-point average include all grades earned at George Washington University and through the Consortium universities while the student is enrolled at GW. The grades used are for academic courses taken in fulfillment of degree requirements and not for remedial courses or those taken to make up deficiencies. (For example, EFL courses numbered 45 and below will not be considered for purposes of probation, suspension, or Dean's List.)

Non-SEAS courses taken in excess of the number needed to fulfill degree requirements are not considered in determining probation, suspension, or Dean's List status. Only courses required for the degree program are considered in determining whether the student has met graduation requirements.

Probation

A full-time student will be placed on probation if his or her grade-point average is less than 2.0 for one semester or if he or she receives more than one grade of *F* in one semester or summer session. A part-time student will be placed on probation if his or her grade-point average is less than 2.0 or he or she has received more than one grade of *F* when he or she has accumulated 12 credit hours. For academic purposes, a new grading period will begin once this accumulation is reached.

A student on probation who earns a grade-point average of 2.0 or better (for 12 or more credit hours) during the semester on probation but also receives a grade of *F* will be continued on probation; students in this category who receive two or more *F*s will be suspended.

A full-time student will be removed from probation when the grade-point average is 2.0 or more with no grade of *F* during the semester on probation. A part-time student will be removed from probation when the grade-point average is 2.0 or more and he or she receives no grade of *F* for the next 12 credit hours after being placed on probation.

Suspension

The following cases constitute grounds for suspension: (1) receipt of two grades of *F* any time during a probation period (part-time students receiving two grades of *F* while on probation will be suspended at the time of receipt of the second of these grades); (2) receipt of four grades of *F* in any semester (or the equivalent for part-time students); (3) placement on probation for a third time; (4) accumulation of a grade-point average of (a) 1.5 or less at the end of the sophomore year or upon completion of the 63rd credit in the student's curriculum, (b) 1.9 or less at the end of the junior year or upon completion of the 97th credit in the student's curriculum, or (c) less than 2.0 at any time during the senior year.

Department faculty may designate additional courses to be taken and grades to be received by students who fail to meet but come close to meeting the graduation requirements. Suspension may be held in abeyance until the conditions are or are not met.

Students readmitted on probation will be suspended if they do not attain a minimum grade-point average of 2.0 during their first semester (12 or more credit hours) or if they receive more than one grade of *F* during the period.

Once suspended, a student may not have that suspension rescinded by a grade change at a later date. The student may, however, apply for readmission noting the grade change. Students who have been suspended may not apply for readmission until one year after the suspension. To be considered for readmission, a student must have undertaken academic work at another institution, primarily in mathematics, science, or engineering, during the year of suspension and earned a grade-point average of at least 2.7.

Dean's Honors and Commendation Lists

The names of all students who, in a given semester, take 12 or more graded credit hours in course work that applies to graduation requirements (or in any additional SEAS courses taken) may appear on the Dean's Honor List if a grade-point average of 3.5 is achieved or on the Dean's Commendation List if a grade-point average of 3.0 is achieved. No disciplinary action may have been taken against the student, and no more than one grade below *B-* and no grades below *C-* may have been earned. A student who receives a grade of *I* (Incomplete) during a semester will not be placed on the Dean's Honors or Commendation List for that semester unless the *I* is removed no later than 30 days after the end of the marking period and the student continues to meet all the requirements for the Dean's Honors or Commendation List.

Incompletes

Conditions under which the grade of *I* (Incomplete) may be assigned are described under University Regulations. If a grade of *I* is not changed to a letter grade within 30 days, decisions on probation, removal from probation, and suspension will be made with the information on hand, in conformance with SEAS regulations.

Although the grade of *I* may remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or required paper) must be made up. The grade of *I* cannot be removed by the student's reregistering for the course here or taking its equivalent elsewhere. A grade of *I* that is not removed after one calendar year or at the time of graduation of the student, whichever occurs first, will be changed on the permanent record to a grade of *IF*. When the *I* is changed to a letter grade, the grade of *I* followed by the letter grade (e.g., *IB*) will appear on the student's record. The grade for which the *I* is changed will be applied to the grade report for the semester or summer session during which

the change is made for the purposes of determining probation, suspension, grade-point average, and Dean's and other honor lists.

Pass/No Pass Grading System

SEAS students may not take courses required for graduation on the pass/no pass (*P/NP*) grading system. They may, however, take courses outside their regular SEAS academic program under this grading system.

Students whose status of probation or suspension depends on a grade of *P* are given 30 days to have the grade changed. If not changed by the end of that period, the *P* will be considered a *C* for probation, suspension, Dean's List, and graduation purposes, and a grade of *NP* will be considered an *F*.

Residence

Thirty hours must be completed in residence. Full-time students normally complete their programs in four years. The core curriculum—the program of the first four semesters—provides the base of scientific principles and mathematical techniques necessary for the professional courses taken in the last four semesters.

Advisory System

Every entering undergraduate student is assigned a faculty advisor to assist in orientation in the professional discipline. Faculty advisors counsel students on their programs of study, achievement and maintenance of satisfactory scholastic performance, professional development, and extracurricular activity as part of the educational process. The advisor represents the student in all cases requiring faculty action.

Students must obtain their advisor's approval of their program of study prior to registration for each academic semester and summer session. The advisor's approval must be obtained before registering for a course at another institution. Until the work required for the degree is completed, students must consult with their advisors in all academic matters. However, an advisor may not deny entry into any course or activity to which the student is entitled under the regulations of the School.

Courses in the Humanities and Social Sciences /Bachelor of Science Programs

With the assistance of the advisor, each engineering student prepares a program of elective courses in the humanities and social sciences. The program normally includes a minimum of 18 credit hours, divided equally between the humanities and social sciences. Each 9-hour group must include two courses in one subject area and a third course in a different subject area. When a foreign language is taken as part of the humanities requirement, the following rules apply: (1) the foreign language studied must not be a native language of the student, unless the courses taken are literature courses; (2) if the student has studied the language previously, he or she must first take a placement test given by the language department concerned and enroll in a course recommended by that department; and (3) the student may use at most two foreign language courses to satisfy SEAS's humanities requirements. If two courses are used, they must be in the same foreign language. The advisor and the curriculum coordinator must approve the program.

Since the SEAS curricula are, by necessity, oriented toward technical subjects, the program in the humanities and social sciences should consist of courses that broaden the student's outlook. Courses in areas such as anthropology, economics, foreign languages, geography, history, literature, philosophy, political science, psychology, and sociology are considered appropriate.

Because most medical and law schools expect applicants to have completed 6 credit hours of English composition, students following one of the medical preparation options or planning a career in law are advised to choose humanities electives with extensive writing requirements.

The listed curriculums on the following pages all assume electives to be at least 3 credit hours. Credit toward the degree is not allowed for exercise and sport activities courses. The key to abbreviations for course designations can be found at the beginning of the Courses of Instruction section.

Bachelor of Science Degree Programs

Civil Engineering

Mission Statement—The mission of the undergraduate civil engineering program is to provide a broad-based, rigorous education in civil engineering, which leads to educating graduates who have a fundamental understanding of the underlying concepts of engineering analysis and design, and a sense of responsibility for professional service.

Educational Objectives—The civil engineering program at The George Washington University is designed to produce graduates who are well prepared to immediately engage in the practice of civil engineering and/or to continue their education in graduate studies in civil engineering or other professional studies such as law, medicine, and business. The three undergraduate curricula in civil engineering, civil engineering with an environmental engineering option, and civil engineering with a medical preparation option are designed to produce graduates who understand the basic principles of applied mathematics, basic sciences, and computing and have the ability to apply these principles in the analysis and solution of civil engineering problems; are trained to conduct, interpret, and evaluate the laboratory experiments used in the main branches of civil engineering; have the skill and knowledge to use modern engineering and computing tools in the solution of the challenging problems encountered in the civil engineering profession; possess a broad education in engineering as well as the humanities and social sciences to comprehend and envision the broader socioeconomic impacts and relevance of civil engineering projects; have the skills required for effective communication as a professional and for participation in the multidisciplinary efforts needed in many civil engineering projects; are fully aware of professional and ethical issues in the practice of civil engineering; and understand the need for lifelong learning and possess the necessary skills to pursue it.

Civil engineering encompasses those branches of engineering most closely related to the control and improvement of our environment and of the physical conditions of life. Civil engineers apply many technical specialties in order to plan, design, and construct projects that range from buildings and transportation systems to space stations and space habitats. The civil engineering curriculum is 129 hours.

First Semester—Engl 9 or 10; SEAS 1; CE 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—CSci 50; MAE 4; Math 32; Phys 21; humanities or social sciences elective.

Third Semester—ApSc 57, 113; Math 33; Phys 22; humanities or social sciences elective.

Fourth Semester—ApSc 58, 115, 130; CE 120; humanities or social sciences electives (6 hours).

Fifth Semester—CE 117, 121, 166, 167; MAE 126, 131; humanities or social sciences elective.

Sixth Semester—CE 122, 188, 192, 193, 194; EES 1.

Seventh Semester—CE 168, 185, 189, 191, 195, 197; technical elective selected from list below.

Eighth Semester—CE 190, 196, 232; technical elective; design elective.

Technical Electives—ApSc 199; CE 198, 205, 206, 207, 210, 211, 230, 231, 234, 243, 244, 250, 251, 252, 253, 254, 257, 258, 272, 273, 290; EMSE 260; MAE 231, 234, 235, 236, 237.

Design Electives—CE 206, 207, 211, 241, 251, 252, 269.

Environmental Engineering Option in Civil Engineering

The environmental engineering option (127 hours) leads to a bachelor's degree in civil engineering. Students are prepared to work in technical environmental fields such as hazardous waste treatment, environmental impact assessment, and water resources engineering. Students are also prepared to pursue graduate study in environmental engineering.

First Semester—Engl 9 or 10; SEAS 1; CE 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—CSci 50; MAE 4; Math 32; Chem 12; Phys 21.

Third Semester—ApSc 57, 113; Math 33; Phys 22; humanities or social sciences elective.

Fourth Semester—ApSc 58, 130; CE 120; humanities or social sciences electives (6 hours).

Fifth Semester—ApSc 115; Chem 105; CE 117, 121; MAE 126; humanities or social sciences elective.

Sixth Semester—CE 122, 188, 192, 193, 194; humanities or social sciences elective.

Seventh Semester—CE 168, 185, 189, 191, 195, 197; technical elective.

Eighth Semester—CE 190, 196, 241; technical elective; design elective.

Technical Electives—ApSc 199; CE 198, 230, 232, 240, 242, 243, 244, 245, 246, 247, 248, 250, 251, 252, 253, 254, 256, 257, 258, 259, 282.

Design Electives—CE 246, 247, 251, 252.

Medical Preparation Option in Civil Engineering

This medical preparation option (138 hours) leads to a bachelor's degree in civil engineering and prepares the student for application to medical school. The student is also prepared to work in research and development or to pursue graduate study in the fields of biomechanics and biotechnology. Students pursuing medical preparation and applying to medical school should consult the SEAS representative to the University's premedical committee.

First Semester—Engl 9 or 10; SEAS 1; CE 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—CSci 50; MAE 4; Chem 12; Math 32; Phys 21.

Third Semester—ApSc 57, 113; BiSc 13; Math 33; Phys 22; humanities or social sciences elective.

Fourth Semester—ApSc 58, 130; BiSc 14; CE 120; ECE 11; humanities or social sciences elective.

Fifth Semester—CE 117, 121, 166, 167; MAE 126, 131; Chem 151, 153.

Sixth Semester—CE 122, 188, 192, 193, 194; Chem 152, 154.

Seventh Semester—CE 168, 185, 189, 191, 197; humanities or social sciences electives (6 hours).

Eighth Semester—ApSc 115; CE 190, 196, 232; humanities or social sciences elective.

Computer Engineering

Mission Statement—The mission of the Department of Electrical and Computer Engineering is to motivate and inspire our students by providing high-caliber, accredited, fully integrated programs in electrical and computer engineering in order to provide leadership in a rapidly evolving global information society in the service of humanity and to advance the state of knowledge in our disciplines by actively pursuing scholarly research for publication and dissemination.

Educational Objectives—The objectives of the computer engineering program are to provide students with an education that will develop their ability to delineate and solve, in a practical way, problems related to computer engineering for the benefit of the society and to pursue a productive career that is characterized by professional growth. The program develops sensitivity to the socially related technical problems of computing and the ethical characteristics of engineering and the use of computing. It also conveys the need for an engineer to practice life-long learning. Specific objectives of the computer engineering program are to teach students how to analyze and implement complex interdisciplinary engineering projects; to give students a strong foundation for graduate studies in the field of computer engineering; to prepare students for competitive and challenging industrial applications; to teach students how to use state-of-the-art computer tools for solving computer engineering problems; to expose students to hands-on engineering experience through laboratory courses; to cultivate the ability of students to communicate and work effectively in teams; and to help students develop an understanding of the ethical issues and global perspectives arising in the practice of the engineering profession. These objectives are consistent with the mission of the Department of Electrical and Computer Engineering and of the institution as a whole.

Computer engineering combines electronic design, computer architecture, programming of computing systems, computer networks, and applied mathematics. Students in the program are prepared in the theory and application of hardware and software design, computer networks, embedded systems, and very large scale integrated (VLSI) circuit design and applications. Students can take electives in advanced topics, such as optical networks, broadband wireless networks, and technologies for the next generation of information systems. The computer engineering curriculum is 128 hours.

First Semester—Engl 9 or 10; Chem 11; Math 31; SEAS 1; ECE 1; elective.

Second Semester—CSci 49; ECE 11; Math 32; Phys 21; elective.

Third Semester—CSci 103; ECE 20, 117; Math 33; Phys 22.

Fourth Semester—ApSc 113, 115; ECE 12, 140; elective.

Fifth Semester—CSci 123, 156; ECE 122, 141, 162.

Sixth Semester—ECE 126, 144/147, 161, 181; elective.

Seventh Semester—ECE 128, 163, 182; two electives.

Eighth Semester—ECE 30, 164; Phil 135; two electives.

The eight electives must include at least five 3-credit humanities or social sciences electives and one humanities, social sciences, or technical elective. At least two technical electives are chosen from ECE 114, 121, 127, 134, 143, 148, 160, 172, 177, 184, 188, 192, 197, 198; approved graduate ECE courses; CSci 141, 151, 161, 173, 174, 180, 185; and advisor-approved undergraduate or graduate courses in engineering, computer science, mathematics, physical sciences, or biological sciences.

Computer Science

The 124-hour program combines systems design, computer software development, networks, computer architecture, and mathematics to provide a broad background in the disciplines that underlie computer science. Students are pre-

pared to design and implement the software needed for Internet operations and applications and for small, large, and embedded computing systems.

First Semester—Engl 9 or 10; CSci 41; Math 20 or 31; SEAS 1; science elective with lab; humanities or social science elective.

Second Semester—CSci 51, 123; Math 21 or 32; science elective with lab; humanities or social science elective.

Third Semester—CSci 131, 135; Math 32 or 33; science elective with lab; humanities or social science elective.

Fourth Semester—ApSc 115; CSci 110, 136, 141; humanities or social science elective.

Fifth Semester—CSci 150, 151, 156; math or science elective; humanities or social science elective.

Sixth Semester—CSci 160, 161, 169; humanities or social science elective; unrestricted elective.

Seventh Semester—CSci 178, 183, 195; computer science elective; non-technical elective.

Eighth Semester—CSci 184, 196; computer science elective; non-technical elective; unrestricted elective.

Science electives must be chosen from BiSc 13–14, Chem 11–12, and Phys 21–22. Two of the three science electives must form a two-course sequence. Computer science electives may be selected from CSci 171, 173, 174, 180, 181, 185, 186, 187, 188, 189, 190, 194, and, with approval, graduate computer science courses. Note that in the first three semesters, an alternative math sequence is Math 20–21 and 32.

Medical Preparation Option in Computer Science

This 129-hour medical preparation option permits the student to obtain a bachelor's degree in computer science and have sufficient preparation to apply to medical school. The student is also prepared to conduct research toward development in the use of computers in medicine and in diagnosis and treatment, or to continue as a graduate student in computer science. Students pursuing medical preparation and applying to medical school should consult the SEAS representative to the University's premedical committee.

First Semester—Engl 9 or 10; Chem 11; Math 20 or 31; CSci 41; SEAS 1; humanities or social sciences elective.

Second Semester—Chem 12; Math 21 or 32; CSci 51, 123; humanities or social sciences elective.

Third Semester—BiSc 13; Math 32 or 33; Phys 1 or 21; CSci 131, 135.

Fourth Semester—BiSc 14; Phys 2 or 22; CSci 110, 136, 141.

Fifth Semester—ApSc 115; Chem 151, 153; CSci 150, 151, 156.

Sixth Semester—Chem 152, 154; CSci 160, 161, 169; non-technical elective.

Seventh Semester—CSci 178, 183, 195; humanities or social science electives (6 hours); non-technical elective.

Eighth Semester—CSci 184, 196; unrestricted elective; humanities or social science electives (6 hours).

Electrical Engineering

Mission Statement—The mission of the Department of Electrical and Computer Engineering is to motivate and inspire our students by providing high-caliber, accredited, fully integrated programs in electrical and computer engineering in order to provide leadership in a rapidly evolving global information society in the service of humanity and to advance the state of knowledge in our disciplines by actively pursuing scholarly research for publication and dissemination.

Educational Objectives—The objective of the electrical engineering program is to educate students in the principles of electrical engineering, including cog-

nizance of their responsibilities as members of society. The engineering education is based on the sciences and the principles of design. Social responsibilities are instilled through a balanced program in the humanities and social sciences as well as coverage of specific topics in professional ethics and social responsibilities. The program provides students with a solid foundation in electrical engineering through a balanced curriculum integrating the underlying scientific and mathematical knowledge with the latest technological developments. The curriculum is designed to produce engineers capable of functioning in the present technological environment, while being capable of adapting to future directions of the profession. Specifically, the program aims to teach students how to analyze and implement complex interdisciplinary engineering projects; to give students a strong foundation for graduate studies in the field of electrical engineering; to prepare students for competitive and challenging industrial applications; to teach students how to use state-of-the-art computer tools for solving electrical engineering problems; to expose students to hands-on engineering experience through laboratory courses; to cultivate students' abilities to communicate and work effectively in teams; and to help students develop an understanding of the ethical issues and global perspectives arising in the practice of the engineering profession. These objectives are consistent with the mission of the Department of Electrical and Computer Engineering and of the institution as a whole.

Electrical engineers design the enabling technology for modern telecommunications networks, including the Internet, biomedical instrumentation, and electromagnetic applications. The program focuses on signal processing; communication theory and practice; voice, data, video and multimedia communication networks; very large scale integrated (VLSI) circuit design and applications; and control systems. Students can take electives in advanced topics, such as optical networks, broadband wireless networks, and technologies for the next generation of information systems. The electrical engineering curriculum is 129 hours.

First Semester—Engl 9 or 10; Chem 11; Math 31; SEAS 1; ECE 1; elective.

Second Semester—CSci 49; ECE 11; Math 32; Phys 21; elective.

Third Semester—CSci 103; ECE 20, 117; Math 33; Phys 22.

Fourth Semester—ApSc 113, 115; ECE 12, 140; elective.

Fifth Semester—ECE 122, 141, 143, 162; elective.

Sixth Semester—ApSc 114; ECE 31, 121, 126, 144/147.

Seventh Semester—ECE 32, 163, 172; two electives.

Eighth Semester—ECE 164, 177; Phil 135; two electives.

The eight electives must include at least five 3-credit humanities or social sciences electives and one humanities, social sciences, or technical elective. At least two technical electives are chosen from ECE 114, 127, 128, 134, 148, 160, 161, 178, 181, 182, 184, 188, 192, 197, 198; approved graduate ECE courses; CSci 141, 151, 173; and approved undergraduate or graduate courses in engineering, computer science, mathematics, physical sciences, or biological sciences.

Medical Preparation Option in Electrical Engineering

This 129-hour medical preparation option permits the student to obtain a bachelor's degree in electrical engineering and have sufficient preparation to apply to medical school. The student is also prepared to work in various health sciences fields, to conduct research toward development of electronic equipment to assist the medical profession in diagnosing and treating disease, or to continue as a graduate student in engineering with exceptional qualifications for medical engineering. Students in this option who intend to apply to medical school should consult the SEAS representative to the University's premedical committee.

First Semester—Engl 9 or 10; Chem 11; Math 31; SEAS 1; ECE 1; elective.

Second Semester—Chem 12; CSci 49; ECE 11; Math 32; Phys 21.

Third Semester—ECE 20, 117; Math 33; Phys 22; elective.

Fourth Semester—ApSc 113, 115; ECE 12, 140; elective.

Fifth Semester—BiSc 13; Chem 151, 153; ECE 122, 141.

Sixth Semester—ApSc 114; BiSc 14; Chem 152, 154; ECE 30; elective.

Seventh Semester—ECE 143, 163, 172, 184, 186; elective.

Eighth Semester—ECE 164; Phil 135; three electives.

The eight electives must include at least five 3-credit humanities or social sciences electives and one humanities, social sciences, or technical elective. At least two technical electives are chosen from ECE 114, 121, 126, 127, 128, 134, 144, 147, 148, 160, 161, 162, 177, 178, 181, 182, 188, 197, 198; approved graduate ECE courses; and CSci 103, 141, 151, 173. At least one of the technical electives must be chosen from ECE 192; BiSc 102, 107, 118, 180.

Mechanical Engineering

Mission Statement—The mission of the Department of Mechanical and Aerospace Engineering is to educate students to become professional mechanical and aerospace engineers who are confident in their understanding of science and technology, who are creative in the face of new challenges, and whose analytical skill and thirst for lifelong learning will open new career horizons; to contribute to society through the conduct of relevant research at the forefront of mechanical and aerospace engineering knowledge and to provide opportunities for students to participate and learn through mentorship with the faculty; and to serve the nation, the community, and the university.

Educational Objectives—The major objective of the undergraduate mechanical engineering program is to provide an integrated program of instruction in mechanical engineering in order to produce graduates who can practice engineering professionally and develop a successful career in engineering. Mechanical engineering is a broad field covering both design and analysis of complex systems that are useful to society. The well-educated mechanical engineer must have a thorough understanding of mechanics (solid and fluid), energy, and the response and control of mechanical systems designed to perform a useful function. In order to fulfill this objective, our program's educational objectives are to give students a thorough grounding in mathematics and the basic sciences and to teach them to apply that knowledge in the design and analysis of engineering systems; to teach students to design engineering systems/devices; to teach students to analyze and solve engineering problems of complex scope; to prepare students for professional engineering practice; to prepare students for graduate study; and to give students the understanding of the need for lifelong learning and the skills to pursue it. These objectives incorporate the development of effective communication skills (oral and written) and the use of software and other tools and knowledge about the ethical, social, and economic impact of engineering practice on society.

Mechanical engineering encompasses a vast range of industrial activities. Mechanical engineers conceive, plan, design, and direct the manufacture, distribution, and operation of complex systems. Applications include aerospace, energy conversion, computer-aided design and manufacturing, power and propulsion systems, robotics, and control systems. The mechanical engineering curriculum is 128 hours.

First Semester—Engl 9 or 10; SEAS 1; MAE 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—CSci 49 or 50, MAE 2, 4; Math 32; Phys 21; humanities or social sciences elective.

Third Semester—ApSc 57, 113; Math 33; Phys 22; humanities or social sciences elective.

Fourth Semester—ApSc 58, 130; ECE 11; MAE 117, 131.

Fifth Semester—CE 120; MAE 126, 166, 167, 190, 192.

Sixth Semester—ApSc 115; MAE 120, 134, 187, 191; humanities or social sciences elective.

Seventh Semester—MAE 149, 182, 193; technical electives (6 hours); humanities or social sciences elective.

Eighth Semester—MAE 152, 195, 196; technical electives selected from chosen area (6 hours); humanities or social sciences elective.

Technical Electives

Mechanical Systems Analysis and Design—ApSc 199; MAE 197, 198, 231, 232, 234, 235, 236, 237, 240, 241, 243, 247, 249, 251, 287.

Fluid Mechanics, Thermal Sciences, and Energy—ApSc 199; MAE 155, 198, 210, 220, 221, 226, 229, 259, 260, 262, 280, 282, 283.

Aerospace Option in Mechanical Engineering

The 128-hour aerospace engineering option leads to a bachelor's degree in mechanical engineering while preparing the student to work in the aerospace industry or to pursue graduate study in aerospace engineering. It provides a strong foundation in aerodynamics, airplane performance, propulsion, aerospace structures, orbital mechanics, spacecraft dynamics, and aircraft and spacecraft design.

First Semester—Engl 9 or 10; SEAS 1; MAE 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—CSci 49 or 50; MAE 2, 4; Math 32; Phys 21; humanities or social sciences elective.

Third Semester—ApSc 57, 113; Math 33; Phys 22; humanities or social sciences elective.

Fourth Semester—ApSc 58, 130; ECE 11; MAE 117, 131.

Fifth Semester—CE 120; MAE 126, 145, 166, 167, 192.

Sixth Semester—MAE 120, 134, 155, 162, 191, 229.

Seventh Semester—ApSc 115; MAE 157, 163, 182, 247; humanities or social sciences elective.

Eighth Semester—MAE 152, 187, 195, 249; humanities or social sciences electives (6 credits).

Medical Preparation Option in Mechanical Engineering

This 139-hour medical preparation option leads to a bachelor's degree in mechanical engineering and prepares the student for application to medical school. The student is also prepared to work in research and development or to pursue graduate study in the fields of biomechanics and biotechnology. Students pursuing medical preparation and applying to medical school should consult the SEAS representative to the University's premedical committee.

First Semester—Engl 9 or 10; SEAS 1; MAE 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—MAE 2, 4; CSci 49 or 50; Math 32; Chem 12; Phys 21.

Third Semester—ApSc 57, 113; Math 33; BiSc 13; Phys 22; humanities or social sciences elective.

Fourth Semester—ApSc 58, 130; ECE 11; BiSc 14; MAE 117, 131.

Fifth Semester—CE 120; MAE 126, 166, 167, 190; Chem 151, 153.

Sixth Semester—MAE 120, 134, 187, 191; Chem 152, 154; humanities or social sciences elective.

Seventh Semester—MAE 149, 182, 192, 193; technical elective; humanities or social sciences elective.

Eighth Semester—ApSc 115; MAE 152, 195, 196; humanities or social sciences electives (6 hours).

Systems Engineering

The multidisciplinary field of systems engineering applies scientific methods and engineering techniques to the solution of complex technical problems. Through the processes of observing, understanding, and predicting the behavior of human-machine interfacing systems, practitioners of systems engineering help in the decision-making process for optimal improvement of these systems. The systems engineering curriculum is 131 hours.

First Semester—Engl 9 or 10; CSci 41; SEAS 1; Math 31; Chem 11; humanities or social sciences elective.

Second Semester—CSci 49 or 51; Math 32; Phys 21; humanities or social sciences electives (6 hours).

Third Semester—ApSc 57, 113; CSci 103 or 131; Math 33; Phys 22.

Fourth Semester—ApSc 114, 115; CE 120; CSci 110; EMSE 160; humanities or social sciences elective.

Fifth Semester—ApSc 116; MAE 117; EMSE 101, 109; Stat 187.

Sixth Semester—Comm 40, 41, or 42; EMSE 102, 269; MAE 120; technical elective; humanities or social sciences elective.

Seventh Semester—MAE 192; EMSE 135, 154, 171; technical elective; humanities or social sciences elective.

Eighth Semester—EMSE 173, 182, 191; two technical electives.

Technical Electives

Each systems engineering major will gain specific expertise in a chosen technical area by taking a four-course sequence from another department or departments of the University. The four technical electives are selected with the approval of the student's academic advisor. Areas frequently chosen are computer science, economics, finance, management, mathematics, naval science, statistics, and specific fields of engineering.

Medical Preparation Option in Systems Engineering

This 139-hour medical preparation option leads to a bachelor's degree in systems engineering and quantitatively prepares students for medical careers through a program that emphasizes decision modeling. Decision modeling is becoming increasingly applicable to the medical field because of the growing use of computers and information systems in medicine and the interplay of diagnosis, treatment, and economics.

First Semester—Engl 9 or 10; CSci 41; Chem 11; SEAS 1; Math 31; humanities or social sciences elective.

Second Semester—Chem 12; CSci 49 or 51; Math 32; Phys 21; humanities or social sciences elective.

Third Semester—ApSc 57, 113; BiSc 13; Math 33; Phys 22.

Fourth Semester—ApSc 114, 115; BiSc 14; CE 120; CSci 103 or 131; EMSE 160.

Fifth Semester—ApSc 116; Chem 151, 153; EMSE 101, 109; MAE 117; Stat 187.

Sixth Semester—Chem 152, 154; Comm 40, 41, or 42; MAE 120; EMSE 102; humanities or social sciences elective.

Seventh Semester—EMSE 135, 154, 171, 269; MAE 192; humanities or social sciences elective.

Eighth Semester—CSci 110; EMSE 173, 182, 191; humanities or social sciences electives (6 hours).

Bachelor of Arts Degree Programs

The School of Engineering and Applied Science offers a Bachelor of Arts degree, with majors in applied science and technology and in computer science. Each program provides a strong and level base for students who intend to make their careers in fields allied to science and technology or to computer science.

Applied Science and Technology

The Bachelor of Arts in applied science and technology is a 126-hour broad-based engineering degree with a breadth of liberal arts for students who plan to continue their education toward professional careers in law, medicine, business, teaching, or the media. Well-founded in science and engineering, the program can help students pursue their goals in a world that relies more and more upon advanced science and technology.

First Semester—Engl 9 or 10, CSci 41, SEAS 1, Chem 11, Math 20, humanities or social science elective.

Second Semester—CSci 10, Chem 12, Math 21, humanities or social science elective, arts elective.

Third Semester—CSci 30, Math 32, Phys 1, literature elective, unrestricted elective.

Fourth Semester—MAE 4, ApSc 115, Phys 2, literature elective, unrestricted elective.

Fifth Semester—CSci 49, BiSc 13, EMSE 101, Comm 40 or 41 or 42, allied minor elective.

Sixth Semester—CSci 110, BiSc 14, two allied minor electives, humanities or social science elective.

Seventh Semester—MAE 192, ECE 184, EMSE 135, allied minor elective, unrestricted elective.

Eighth Semester—CE 190, allied minor elective, humanities or social science elective, two unrestricted electives.

Electives—Electives in literature and arts are chosen from specified lists of courses available from the advisor. Allied minor electives are chosen from specified courses in the following areas: business, civil engineering, communication, computer science, computer engineering, design, economics, electrical engineering, environmental studies, international business, management, mathematics, mechanical engineering, media, medical preparation, statistics, and systems engineering.

Computer Science

The 121-hour Bachelor of Arts in computer science provides a broad-based liberal arts curriculum for students who wish to augment technical knowledge with business, communication, and management skills. Foundation courses focus on mathematics, science, programming methodology and skills, computer organization and design, and implementation of algorithms. Additional breadth or depth is afforded by a selection of computer science electives.

First Semester—Engl 9 or 10, Math 20 or 31, CSci 41, SEAS 1, science elective, humanities or social science or business elective.

Second Semester—Math 21 or 32, CSci 51 and 123, science elective, humanities or social science or business elective.

Third Semester—CSci 131, Phil 45, science elective, humanities or social science or business elective, unrestricted elective.

Fourth Semester—CSci 110 and 141, Engl 11, humanities or social science or business elective, unrestricted elective.

Fifth Semester—CSci 52, ApSc 115 or Stat 51, literature elective, arts elective, unrestricted elective.

Sixth Semester—CSci 169, culture elective, literature elective, unrestricted electives (6 hours).

Seventh Semester—Computer science elective, culture elective, unrestricted electives (9 hours).

Eighth Semester—Computer science electives (6 hours), unrestricted electives (9 hours).

Electives—Electives in literature and arts are chosen from specified lists of courses available from the advisor. Electives in computer science may be chosen from any courses at the 100 or 200 level. A maximum of two unrestricted electives may be computer science courses.

Special Programs

Five-Year Bachelor of Science (Systems Engineering)/ Master of Arts in the Field of Economics

First Semester—Engl 9 or 10; CSci 41; SEAS 1; Math 31; Chem 11; Econ 11.

Second Semester—CSci 49 or 51; Math 32; Phys 21; Econ 12; humanities elective.

Third Semester—ApSc 57, 113; CSci 103 or 131; Math 33; Phys 22.

Fourth Semester—ApSc 114, 115; CE 120; CSci 110; Econ 101; EMSE 160.

Fifth Semester—ApSc 116; Econ 102; MAE 117; EMSE 101, 109; Stat 187.

Sixth Semester—Econ 123; Comm 40, 41, or 42; MAE 120; EMSE 102; humanities elective.

Seventh Semester—Econ 203; EMSE 135, 154, 269; MAE 192; humanities elective.

Eighth Semester—Econ 204, 205; EMSE 173, 182, 191.

Course work for the bachelor's degree differs from the standard B.S.(S.E.) in that the three social science electives and four technical electives are all in economics, and that Econ 123 substitutes for EMSE 171. Application to the graduate portion of the program is ordinarily made after the fifth semester, and students must be accepted for the graduate portion prior to the start of the seventh semester. The bachelor's degree is awarded after the eighth semester.

The ninth and tenth semesters consist of course work toward the master's degree. Required: the general requirements of Columbian College of Arts and Sciences, including Econ 206 and 275 and six graduate economics electives. The Master's Comprehensive Examination must be satisfactorily completed in microeconomic and macroeconomic theory. See the Graduate Programs Bulletin.

Five-Year Bachelor of Science (Systems Engineering)/Master's Degree in the Fields of Engineering Management or Systems Engineering

Course work for the bachelor's degree differs from the standard B.S.(S.E.) only in that the four technical electives are designated EMSE courses at the graduate level. Application to the graduate portion of the program is ordinarily made after the fifth semester, and students must be accepted for the graduate portion prior to the start of the seventh semester. The bachelor's degree is awarded after the eighth semester.

The fifth year of study, leading to the Master of Engineering Management or Master of Science in the fields of engineering management or systems engineering, consists of nine courses (nonthesis option) selected from the engineering management or systems engineering graduate programs of study. After completing the fifth year of course work, students receive the M.E.M. or M.S. degree. See the Graduate Programs Bulletin.

Five-Year Programs in Engineering and Physics

Five-year programs that lead to a Bachelor of Arts with a major in physics and a Bachelor of Science in any SEAS undergraduate field are available. Please check with the SEAS Office of the Dean or with the Physics Department of Columbian College of Arts and Sciences.

Integrated Engineering and Law Program

In addition to the combined bachelor's/master's programs that may be completed in five years, the University offers the integrated engineering and law program. The program provides an opportunity for very highly qualified high school students to follow an education path composed of a B.S. or B.A. degree in a SEAS field and then a J.D. degree, by assuring admission to the Law School's J.D. program for students who meet stated conditions. Detailed information on this program is available from the Office of Admissions.

Integrated Engineering and Medicine Program

The University offers an eight-year, integrated engineering and medicine program that provides an opportunity for very highly qualified high school students to earn a B.S. or B.A. degree in a SEAS field and then an M.D. degree, by assuring admission to the School of Medicine and Health Sciences M.D. program for students who meet stated conditions. Detailed information is available from the Office of Admissions.

Honors Research Program

To provide individualized research experience to academically gifted students, the School has established an Honors Research Program. A student who maintains a grade-point average of 3.3 or above or is admitted to the School with a combined SAT score of 1250 and a rank in the upper 10 percent of his or her high school class is eligible for this program. Participants attend an honors research seminar and each works individually with a faculty member, performing a research project of mutual interest. Students participating in the program earn 3 credits per semester; a minimum of 9 credits is needed to complete the program. Upon written request by the student, 6 of these credits may be used as technical electives. Qualified students interested in applying for the program should contact the honors research chairman of the department in which the research is to be conducted.

Minor and Secondary Fields of Study

School of Engineering and Applied Science students with majors other than systems engineering may graduate with a minor in operations research in addition to their major. Four courses are required for the minor: EMSE 101, 102, 154 or 173, and a fourth course selected from EMSE 135, 154, 171, 173, 182. Depending on the student's major, additional credit hours beyond the minimum required for the major may be necessary in order to complete the minor in operations research; students should consult their advisors before embarking upon the minor requirements.

The School offers secondary fields of study in computer science, electrical engineering, engineering analysis, and operations research to students in other schools of the University. SEAS students are cautioned to consult their advisor and department chair before enrolling in a secondary field of study in another school of the University.

Dual Majors

A SEAS student with a B.A. major either in computer science or applied science and technology may pursue a second B.A. major in Columbian College of Arts

and Sciences or the Elliott School of International Affairs, provided permission to do so is obtained from both schools concerned. The student's completion of the B.A. program in SEAS will be deemed to satisfy the general curriculum requirements of the second major. Undergraduates in the Elliott School or in Columbian College may likewise pursue a second B.A. major in SEAS, again provided that permission to do so has been obtained from both schools concerned. (Dual majors in communication, electronic media, journalism, and political communication are excluded from this option.) The second major may supplement the SEAS major but not substitute for it.

3:2 Dual-Degree Programs Combining Liberal Arts and Engineering

The School of Engineering and Applied Science has developed 3:2 dual-degree programs in liberal arts and engineering with the following accredited institutions: Bowie State University, Gallaudet University, University of Richmond, Hood College, St. Thomas Aquinas College, and Trinity College of Washington, D.C.

Students initially enroll in the 3:2 dual-degree program at one of the above institutions and pursue a three-year course of studies covering social sciences, humanities, mathematics, physics, and chemistry, which helps the student develop broad cultural perspectives, analytic abilities, and communication skills. Students then follow a two-year program at the School of Engineering and Applied Science. During this phase of study, students may specialize in any of the areas of engineering or computer science offered in the School's regular four-year programs. Upon successful completion of the two-year program at George Washington University, students are awarded two baccalaureate degrees: a B.S. or B.A. from the first institution and a B.S. in engineering or computer science from GW. For further information on the 3:2 dual-degree programs, contact the admissions offices of the institutions listed above.

In addition, SEAS participates in a 2:2 program with Richmond College in London, England.

ELLIOTT SCHOOL OF INTERNATIONAL AFFAIRS

Dean H. Harding

Associate Deans H. Feigenbaum, B.D. Miller

The Elliott School of International Affairs offers graduate and undergraduate programs to prepare individuals for understanding and working in an increasingly globalized world. The historical roots of the Elliott School extend back to the establishment of the School of Comparative Jurisprudence and Diplomacy in 1898. In 1966, the School separated from the School of Government, Business, and International Affairs to become an independent unit, the School of Public and International Affairs. In 1987, the name was changed to the School of International Affairs, and in 1988 the School was renamed in honor of Evelyn E. and Lloyd H. Elliott. Lloyd Elliott was the President of The George Washington University from 1965 to 1988.

The Degree of Bachelor of Arts

The Elliott School offers programs leading to the degree of Bachelor of Arts with majors in international affairs, Asian studies, Latin American studies, and Middle Eastern studies. These programs provide a broad liberal arts education and depth in historical and contemporary issues in international affairs. The programs are interdisciplinary and multidisciplinary, combining courses offered through the School with courses offered by other schools and departments of the University.

General Requirements for the Degree

Academic Work Load

The normal academic work load for a full-time student is 15 credit hours. A full-time student not on probation may take a course load of up to 17 credit hours. A student with a strong academic record may take up to 18 credit hours with the approval of the dean (additional tuition charges apply). Students on probation are limited to 13 hours. Students doing internships or working are advised to reduce their course load.

Scholarship Requirements

In order to graduate, a student must have the following: (1) 120 credit hours of passing grades (courses in exercise and sport activities cannot be included in the required hours); and (2) a cumulative grade-point average of at least 2.0.

Dean's Honor List

The name of every student who attains a 3.5 grade-point average in course work is placed on the Dean's Honor List for that semester. Appearance on the list is limited to full-time students registered for a minimum of 12 credit hours in a given semester and to part-time students registered for a minimum of 12 credit hours over a period of two consecutive semesters, which may include a summer term.

Academic Standing

A student whose cumulative grade-point average is less than 2.0 but at least 1.0 any time after having attempted a minimum of 24 credit hours is placed on probation: "first probation" for the initial semester, "second probation" if continued on probation for a second semester. For part-time students and those

enrolled in summer sessions, a semester is interpreted to mean a time interval in which at least 12 credit hours have been attempted. A student on probation is limited to no more than 13 credit hours of course work per semester.

A student who resumes a cumulative grade-point average of 2.0 or more after a first or second semester on probation is removed from probationary status. Failure to resume a cumulative grade-point average of 2.0 after two successive semesters on probation results in suspension. The Dean's Council may continue a student on probation if satisfactory progress is demonstrated during the probation period.

A student whose cumulative grade-point average falls below 1.0 any time after having enrolled in a minimum of 24 credit hours as a student in the Elliott School will be suspended.

Students who are suspended for poor scholarship may apply for readmission after the lapse of one fall or spring semester. To be considered for readmission, the student must submit evidence to the Dean's Council of conduct during absence from the University which indicates that the student will profit from readmission. A student suspended twice for poor scholarship will not be readmitted.

Semester Warning—A student whose cumulative grade-point average is less than 2.0 after attempting a minimum of 12 credit hours is placed on semester warning at the end of the semester and is strongly advised to take corrective measures (e.g., limitation of course load to no more than 13 credit hours).

Incompletes

Conditions under which the grade of *I* (Incomplete) may be assigned are described under University Regulations. Incomplete course work must be completed no later than one calendar year from the last day of the examination period of the semester or summer session in which the grade of *I* was assigned. When work for the course is complete, the grade earned will be indicated in the form of *I*, followed by the final grade. The indication of *I* cannot be removed from the transcript. A grade of *I* that is not changed within this period automatically becomes an *IF*. The grade of *I* cannot be changed by reregistering for the course at GW or by taking its equivalent elsewhere. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean's Council for additional time in which to complete the work of the course. Such petitions should be submitted within a year of the assignment of the grade of *I*.

Residence

Students who do not study abroad must complete at least 60 of their final 90 hours in residence to earn a degree in the School. Students approved for study abroad must complete at least 45 of their final 90 hours in the School. Note that in all cases a total of 60 credit hours in residence is required for Latin or special honors. Except in special circumstances, at least 9 of the final 15 hours must be completed in residence.

Internships

Internships offer students the opportunity to make practical use of the knowledge they acquire in the classroom. Undergraduates who have completed at least 30 credit hours and have a cumulative grade-point average of at least 2.5 are eligible to arrange internships for credit (to a total maximum of 6 credits toward the degree). Academic work in the field of the internship is required. A zero-credit internship is also available.

Internships are available in the private and public sectors. Students are responsible for locating their own internships; listings are posted in the GW Career Center. (Additional listings are posted in the Elliott School.)

Double Majors

A student who completes the requirements of two majors in the Elliott School (for example, international affairs and Asian studies) may graduate with a double major. Such a student should consult with an Elliott School advisor and officially declare both majors on the appropriate form available in the Student Services office.

Students may combine a major field in the Elliott School with a second major field offered by the Columbian College of Arts and Sciences or the School of Engineering and Applied Science, as long as the other major is toward a B.A. (majors in Communication and in the School of Media and Public Affairs are excluded). Permission for the second major must be obtained from the appropriate administrative office of the other school.

Students in the Columbian College of Arts and Sciences, whether pursuing a B.A. or a B.S. major, may also take a second major in the Elliott School. Students in the School of Engineering and Applied Science pursuing a B.A. may take a second major in the Elliott School. Students wishing to pursue these options must request approval through the Elliott School Student Services office. Students must complete all of their degree requirements for their major in their home school in order to graduate with a second major from the other school.

Regulations on Study Abroad

Students are encouraged to travel and study abroad. Those wishing to study abroad must consult their academic advisor and the study-abroad advisor. A maximum of 45 credits may be transferred in from study abroad (work completed at the GW Madrid Program or GW summer courses at Al Akhawayn University in Morocco does not count toward this maximum). Students must secure the dean's prior approval for any plan of study abroad if the credit earned is intended to apply to the degree program in which they are registered. A catalogue or other description of the foreign institution or study program must be presented for consideration together with detailed descriptions of the courses to be taken. See Study Abroad Programs.

Pass/No Pass Option

A student in the Elliott School of International Affairs who has a cumulative grade-point average of 2.5 or better may, with the approval of an advisor and the dean, take one course per semester and receive a grade of *P*, Pass, or *NP*, No Pass, which will be recorded on the student's transcript but will not be reflected in the cumulative grade average. A student must sign up for such an option at the Student Services office within the first three weeks of classes. Under no circumstances may a student change from pass/no pass status to graded status, or vice versa, after the end of the third week of the semester. Required courses in the student's major (except those in which the grade of *P* or *NP* is normally assigned) may not be taken on a pass/no pass basis. A transfer student may not elect to take a course on a pass/no pass basis until the second semester of enrollment in the University. No more than six courses in which the grade of *P* or *NP* is assigned will apply toward the degree, including courses in which the grade of *P* or *NP* is normally given.

General Curriculum Requirements

General curriculum requirements for all Elliott School students are listed below. Requirements for the specific majors in international affairs, Latin American studies, Middle Eastern studies, and Asian studies are outlined under the appropriate heading in Courses of Instruction. For information on earning credit

by examination or waiving curriculum requirements, students should see their academic advisor in the Elliott School.

All students take (1) 6 credits of English composition; (2) 6 credits of math and/or science courses; (3) 9 credits of humanities and creative arts courses; (4) 16 credits of social science courses, including Econ 11-12; Hist 40 and 72; IAff 5; PSc 1; and one course chosen from Anth 2, 4; Geog 1, 2, 120; PSc 2; (5) 9 credits of courses relating to Western societies and cultures (including Hist 40 and 72) and 6 credits relating to non-Western societies and cultures (may include courses used to fulfill other general curriculum requirements); (6) 14-16 credits of a modern foreign language (through a second-year level of proficiency). All Elliott School majors require third-year-level proficiency in a modern foreign language. Students should consult the program guidelines available from the Elliott School Office of Student Services before they choose courses to fulfill these requirements.

Secondary Fields of Study

Students can take a secondary field of study, such as business, economics, or languages, in other schools of the University. Students from other schools of the University can take a secondary field of study in international affairs in the Elliott School of International Affairs. See an academic advisor in the Elliott School.

SCHOOL OF MEDICINE AND HEALTH SCIENCES

Bachelor of Science in Health Sciences Degree Programs

The School of Medicine and Health Sciences offers programs to prepare health sciences professionals in selected disciplines, emphasizing the interdependent roles of the network of professionals who constitute the health care team.

In addition to the Bachelor of Science in Health Sciences degree programs listed below, certificate programs are offered in several areas—some in conjunction with degree programs, others freestanding, such as clinical laboratory science, emergency paramedicine, and sonography.

Via distance education, the Bachelor of Science in Health Sciences degree may be earned in the fields of clinical management and leadership and clinical research administration (degree or certificate option). A concentration in emergency medical services management within the field of emergency health services is also provided via distance education.

For specific information on the content and requirements of the undergraduate degree programs that are briefly described below, contact the Office of Recruitment and Admissions for Health Sciences Programs, School of Medicine and Health Sciences, George Washington University Medical Center, Washington, D.C. 20037.

Clinical Laboratory Science

Clinical laboratory scientists perform and evaluate various laboratory procedures to determine the absence, presence, extent, and basis of disease. As medical investigators, program graduates perform complex examinations on state-of-the-art instruments and computers in the areas of hematology, chemistry, microbiology, immunology, and blood banking.

The program in clinical laboratory science leads to a Bachelor of Science in Health Sciences degree. Students applying to the 125-credit-hour program must (1) have satisfactorily completed 60 credit hours in specified general curriculum courses, (2) complete a personal interview, (3) submit letters of recommendation from science instructors, and (4) sign a Technical Standards Acknowledgement Form. In addition to the 60 credit hours of general curriculum courses, students must complete 65 credit hours in the major, including the 15-credit-hour health sciences core, 41 credit hours of specified pathology courses, and 9 credit hours of approved electives.

Emergency Health Services

Emergency health services personnel may plan and organize programs, supervise emergency department clinicians, assist in projects that require expertise in emergency medical procedures, and function in the network of information systems that is central to emergency care.

The program in emergency health services leads to a Bachelor of Science in Health Sciences degree. Where applicable, the following records should be provided: verification of satisfactory completion of prehospital clinical training, proof of current participation in an emergency medical services system, and photocopies of scores or certificates from national registry examinations or certifying board examinations. Before the first day of classes, students admitted to the program must submit a letter from a physician attesting to their good health and including the results of testing for tuberculosis and a statement of current immunization status. The program requires 126 credit hours, including 60 prerequisite credit hours in specified general curriculum requirements, the 15-credit-hour health sciences core, and 51 credit hours specific to a selected concentration either in emergency paramedicine or in emergency health services.

Radiologic Sciences (with a concentration in Diagnostic Medical Sonography)

Using ultrasound technology, diagnostic medical sonographers scan patients to obtain images that help physicians diagnose disease. Students in the bachelor's degree program develop competencies in at least four sub-specialities of ultrasound imaging.

The program in radiological sciences with a concentration in diagnostic medical sonography leads to a 123-credit-hour Bachelor of Science in Health Sciences degree. Students applying to the program must have satisfactorily completed 60 credit hours in specified general curriculum requirements, of which up to 48 hours may be credited from completion of an approved program in diagnostic radiology, nuclear medicine technology, radiation therapy technology, or diagnostic medical sonography, provided students hold or will hold current registration during the first semester of study at The George Washington University. In addition to the 15-credit-hour health sciences core, students must complete 42 credit hours of specified radiology courses and 6 credit hours of approved electives.

See Health Sciences in the course listings section for courses that pertain to a secondary field in that subject, offered by the School of Medicine and Health Sciences. A secondary field in emergency health services is offered as well.

Joint Degree Programs Leading to the Doctor of Medicine

In addition to the integrated Bachelor of Arts/Doctor of Medicine program described under Columbian College of Arts and Sciences, the School of Medicine and Health Sciences offers an early selection program intended to give talented and committed students early assurance of admission to the M.D. program. Students of exceptional promise are chosen for the early selection program at the end of their sophomore year and are expected to modify their planned curriculum for the junior and senior years toward more creative and difficult course choices. Early assurance of admission is planned to provide students the freedom to pursue a rigorous liberal education, while completing minimal premedical requirements without concern for the grade-point average. Specific details about the early selection program are available through the Office of Admissions of the School of Medicine and Health Sciences.

SCHOOL OF PUBLIC HEALTH AND HEALTH SERVICES

Bachelor of Science in the Field of Exercise Science

The School of Public Health and Health Services offers a Bachelor of Science degree program in the field of exercise science through the Department of Prevention and Community Health. For specific information on the content and requirements of the undergraduate degree program, contact the Exercise Science Programs, School of Public Health and Health Services, George Washington University, Washington, D.C. 20037.

The Bachelor of Science program in the field of exercise science requires a minimum of 124 credit hours, consisting of 45–47 credit hours of general curriculum requirements, 42 credit hours of core courses, 18–33 credit hours of courses in the concentration, and electives as necessary to complete the program. The following concentrations are available.

Athletic Training Concentration—This curriculum prepares students for employment at the high school, collegiate, and professional athlete's level and for working in rehabilitation settings. Graduates are prepared to take the National Athletic Training Association certification examination. The GW athletic training concentration in exercise science is accredited by the Commission on Accreditation of Allied Health Education Programs.

Exercise and Sport Concentration—This curriculum prepares students for entry-level exercise science positions and for graduate study in exercise or sport psychology, coaching education, or exercise physiology. Career directions include the health and fitness industry in corporate, private, or government health and wellness programs, exercise physiology, and personal training or coaching.

Health Education and Wellness Concentration—This curriculum prepares students for entry-level positions in the field of health education and graduate study in public health. Internship opportunities in health education programs for children, adolescents, women, and the elderly provide eligibility experience to take the examination to become a Certified Health Education Specialist.

Pre-Health Professional Concentration—This curriculum prepares students for application to medical, physical therapy, physician assistant, nursing, and public health professional or graduate degree programs. An internship course develops a knowledge base and clinical skills that support application to professional programs.

See the entries for Exercise Science and for Public Health in the course listings section for courses that pertain to secondary fields in those subjects that are offered by the School of Public Health and Health Services.



Courses



COURSES OF INSTRUCTION

The following section provides listings and descriptions of undergraduate courses offered by the departments of instruction and interdepartmental programs. Degree requirements of departments and programs in Columbian College of Arts and Sciences and the Elliott School of International Affairs appear under the department or program heading; degree requirements of the School of Engineering and Applied Science and the School of Business and Public Management appear under the respective school's section.

The number of credit hours given for the satisfactory completion of a course is, in most cases, indicated in parentheses after the title of the course. Thus, a year course giving 3 credit hours each semester is marked (3-3), and a semester course giving 3 credit hours is marked (3). A credit hour may be defined as one 50-minute period of class work or one laboratory period a week for one semester.

Following most course descriptions is a parenthetical statement listing the semester (fall or spring) for which the course is scheduled. The term *academic year* is used only with two-semester courses and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester. Not all offerings for the summer sessions are listed in this Bulletin. Students should consult the Summer Sessions Announcement for additional summer offerings. Schedules of Classes are published for the fall and spring semesters to provide information concerning the time of course offerings.

The courses as listed here are subject to change. The University reserves the right to withdraw any course announced or to change the course fees shown.

Key to Abbreviations

The following abbreviations are used for course designations:

Accy	Accountancy	EMda	Electronic Media
AmSt	American Studies	EMed	Emergency Medicine
Anat	Anatomy	EMSE	Engineering Management and Systems Engineering
Anes	Anesthesiology	Engl	English
Anth	Anthropology	EFL	English as a Foreign Language
ApSc	Applied Science	EnRP	Environmental and Resource Policy
Arab	Arabic	Epid	Epidemiology
AH	Art History	EMBA	Executive Master of Business Administration
ArTh	Art Therapy	ExSA	Exercise and Sport Activities
Astr	Astronomy	ExSc	Exercise Science
Bioc	Biochemistry	Film	Film Studies
BiSc	Biological Sciences	Fina	Finance
BmSc	Biomedical Sciences	FA	Fine Arts
Bios	Biostatistics	ForS	Forensic Sciences
BAdm	Business Administration	Fren	French
Chem	Chemistry	Gnet	Genetics
Chin	Chinese	Geog	Geography
CE	Civil Engineering	Ger	German Language and Literature
Clas	Classical Studies	Grek	Greek
CCAS	Columbian College of Arts and Sciences	HCS	Health Care Sciences
Comm	Communication	HSci	Health Sciences
CSci	Computer Science	HSMP	Health Services Management and Policy
Cnsl	Counseling	Hebr	Hebrew
EES	Earth and Environmental Sciences	Hist	History
Econ	Economics	HomP	Hominid Paleobiology
Educ	Educational Leadership		
ECE	Electrical and Computer Engineering		

Honr	Honors	Phys	Physics
HDev	Human Development	Phyl	Physiology
HRD	Human Resource Development	PCm	Political Communication
HmSc	Human Sciences	PMgt	Political Management
HmSr	Human Services	PPsy	Political Psychology
Hmn	Humanities	PSc	Political Science
Immu	Immunology	Port	Portuguese
Idis	Interdisciplinary Courses	PsyD	Professional Psychology
IAff	International Affairs	Pchi	Psychiatry and Behavioral Sciences
IBus	International Business	Psyc	Psychology
Ital	Italian	PAd	Public Administration
Japn	Japanese	PubH	Public Health
Jour	Journalism	PPol	Public Policy
Kor	Korean	Rad	Radiology
Latn	Latin	Rel	Religion
Law	Law	Rom	Romance Literatures
Ling	Linguistics	SEAS	School of Engineering and Applied Science
Mgt	Management Science	SMPA	School of Media and Public Affairs
Mktg	Marketing	SLP	Service-Learning Program
MBAd	Master of Business Administration	Slav	Slavic Languages and Literatures
Math	Mathematics	Soc	Sociology
MAE	Mechanical and Aerospace Engineering	Span	Spanish
Med	Medicine	SpEd	Special Education
Micr	Microbiology	SpHr	Speech and Hearing
Onco	Molecular and Cellular Oncology	Stat	Statistics
MStd	Museum Studies	SMPP	Strategic Management and Public Policy
Mus	Music	Surg	Surgery
NSc	Naval Science	TrEd	Teacher Education
NSur	Neurological Surgery	TCom	Telecommunication
Neur	Neurology	TrDa	Theatre and Dance
NeuS	Neuroscience	TStd	Tourism Studies
Ob&G	Obstetrics and Gynecology	Univ	University
Opht	Ophthalmology	Urol	Urology
OrSc	Organizational Sciences	Viet	Vietnamese
Orth	Orthopaedic Surgery	WLP	Women and Leadership Programs
Path	Pathology	WStu	Women's Studies
PStd	Peace Studies	Ydsh	Yiddish
Ped	Pediatrics		
Phar	Pharmacology		
Phil	Philosophy		

Explanation of Course Numbers

Courses numbered 1-100 are planned for students in the freshman and sophomore years. With the approval of the advisor and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisites to advanced courses, but they may not be taken for graduate credit.

Courses numbered 101-200 are planned for students in the junior and senior years. Except for accountancy courses, they may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work to receive graduate credit. Accountancy courses numbered 101-200 may not be taken for graduate credit.

Courses numbered 201-300 are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates. Qualified seniors in the School of Business and Public Management registering for these courses must have a 3.0 average,

the prior approval of the department chairman who is responsible for the graduate course, and the prior approval of the dean. Nondegree students who have not completed a bachelor's degree may not enroll in graduate courses offered by the School of Business and Public Management. A few courses are numbered in the 400s and 600s to set them apart for various administrative reasons; these courses are generally analogous to courses numbered in the 200s.

Courses numbered 301–400 in Columbian College of Arts and Sciences and the School of Engineering and Applied Science are limited to graduate students, but they are primarily for doctoral candidates. Courses numbered 301–400 in the School of Business and Public Management are primarily for doctoral students; the courses are open to selected master's students upon approved petition. In the Graduate School of Education and Human Development courses numbered 301–400 are limited to graduate students with master's degrees from accredited institutions.

Courses numbered 701 and 721 represent an ongoing program of curriculum innovation at GW. The 701 number is used to designate experimental courses taught by individual faculty members. The 721 number designates innovative interdepartmental courses. The 751 number is used to list courses sponsored jointly by two or more schools. Courses numbered in the 770s and 780s are taught by scholars who hold appointments as University Professors. The 700 numbers do not indicate the level of difficulty. Courses in this series range from freshman-level offerings to classes designed for seniors and graduate students. Unless the course description in the *Schedule of Classes* indicates that there are prerequisites or that an interview with the instructor is required prior to registration, 700 courses are open to all interested students, subject to their advisor's approval and the rules of the respective schools.

ACCOUNTANCY

Professors C.M. Paik, J. Hilmv, D.R. Sheldon, W.R. Baber, K.R. Kumar

Associate Professors L.G. Singleton, K.E. Smith (*Chair*), L.C. Moersen, F.W. Lindahl, S.H.

Kang, M. Yahya-Zadeh

Assistant Professors G. Visvanathan, C.L. Jones, R.L. Tarpley, W.L. Yaeger (*Visiting*)

See the School of Business and Public Management for programs of study in accountancy leading to the degree of Bachelor of Accountancy.

- | | | |
|--|---|-----------|
| 51 | Introductory Financial Accounting (3) | Kumar |
| Basic knowledge of financial accounting concepts and standards as an essential part of the decision-making process for the management of private investment and for business and government organizations. Same as BAdm 51. Prerequisite: sophomore standing. (Fall and spring) | | |
| 52 | Introductory Managerial Accounting (3) | Lindahl |
| Basic knowledge of managerial accounting concepts, procedures, analyses, and internal reports as an essential part of the decision-making process for public and private-sector organizations. Same as BAdm 52. Prerequisite: Accy/BAdm 51. (Fall and Spring) | | |
| 110 | Financial Statement Analysis (3) | Kumar |
| Introduction to the analysis and interpretation of corporate financial statements within the context of a company's industry and economic environment. Cash flow analysis, profitability and risk analysis, accounting policy analysis, forecasting and performance analysis, elements of equity valuation, and decision perspectives of creditors. Prerequisite: Accy/BAdm 51, 52. (Fall) | | |
| 121 | Intermediate Accounting I (3) | Singleton |
| Accounting principles underlying the preparation of financial statements and their application in the measurement and reporting of selected balance sheet items and related revenue and expense recognition; accounting for receivables, inventories, fixed assets, intangible assets, and liabilities. Prerequisite: Accy 51. (Spring) | | |

- 122 **Intermediate Accounting II (3)** Singleton
Accounting for stockholders' equity, earnings per share, debt and equity investments, income taxes, pensions and other postretirement benefits, leases, accounting changes, statement of cash flows, financial statement analysis and disclosure. Prerequisite: Accy 121. (Fall)
- 151 **Business Law: Contracts, Torts, and Property (3)** Staff
Essential legal principles of contracts, torts, and property, including trusts and estates, leases, professional liability, and the Uniform Commercial Code. Same as SMPP 105. Prerequisite: Accy/BAdm 51. (Fall)
- 152 **Business Law: Enterprise Organization (3)** Staff
The legal aspects of organizing, financing, and operating an enterprise: agency, partnerships, corporations, securities regulation, insurance, secured credit financing, and commercial paper. Same as SMPP 106. Prerequisite: Accy/BAdm 51. (Spring)
- 153 **Business Law: Regulatory Environment of Business (3)** Moersen
General overview of the legal system, role of law, and business regulation. Specific business applications include administrative law, antitrust, employer and consumer obligations, securities regulation, international law. Same as SMPP 104. (Fall and spring)
- 161 **Federal Income Taxation (3)** Smith
A study of federal income tax concepts with primary emphasis on individuals. Prerequisite: Accy 51. (Fall)
- 171 **Auditing (3)** Staff
A study of generally accepted auditing standards, accepted professional auditing practices and procedures, and governmental auditing standards, including reviewing and evaluating financial controls, auditing financial statements, and testing financial data of manual and computer based accounting systems. Prerequisite: Accy 122. (Fall)
- 181 **Accounting Systems (3)** Staff
Introduction to the design and operation of accounting systems and data-management controls. Principles and applications of internal control applicable to manual and automated accounting systems. Prerequisite: Accy 101, 122. (Fall)
- 190 **Special Topics (3)** Staff
Experimental offering: new course topics and teaching methods. Prerequisite: department approval.
- 192 **Advanced Financial and Tax Accounting (3)** Smith
Accounting for partnerships and corporations. Formation, operation, and liquidation of each type of entity, including corporate combinations. Both financial and tax accounting for each type of transaction. Prerequisite: Accy 121, 161. (Spring)
- 193 **Advanced Managerial Accounting (3)** Baber
Techniques and practices that foster an informed use of financial information for planning, resource allocation, performance evaluation, and control purposes. Integration of concepts from other disciplines, especially economics, quantitative methods, behavioral science, and business policy and strategy. Primarily taught using case method. Prerequisite: Accy 52. (Spring)
- 196 **Financial Accounting Capstone (3)** Kumar
Synthesis and application of knowledge of financial accounting to specific contexts, using the perspectives of the preparer and user of financial statements. Prerequisite: senior status. (Fall)
- 199 **Independent Study (3)** Staff
Assigned topics. Admission by permission of the department chair. (Fall and spring)

AFRICANA STUDIES

Committee on Africana Studies

J.A. Miller (*Director*), A. Alexander, N. Blyden, A. Brooks, Y. Captain, R. Grinker, J. Hampton, J. Horton, J. James, M. Jones, K. Lornell, D. Moshenberg, P. Palmer, J. Vlach, G. Wald

Minor in Africana studies—Offered through Columbian College of Arts and Sciences, the interdisciplinary minor consists of 21 credit hours, including a four-course core of

Anth 178, AmSt/Hist 173, Hmn 7, and either Hist 116 or Anth 181, plus three additional courses selected either from African or African American courses, as listed below. Special topics or 700 courses that pertain may be selected with approval of the advisor.

AmSt/Hist 173	<i>African American History</i>
Anth 170	<i>Cultures of the Caribbean</i>
Anth 178	<i>Cultures of Africa</i>
Anth 181	<i>African Roots from Australopithecus to Zimbabwe</i>
Engl 73-74	<i>Literature of Black America</i>
Engl 169	<i>Ethnicity and Place in American Literature</i>
Engl 174	<i>African American Literature</i>
Geog 164	<i>Geography of Africa</i>
Hist 116	<i>History of Africa</i>
Hist 174	<i>Special Topics in African American History</i>
Hist 184	<i>Civil War and Reconstruction</i>
Hmn 7	<i>African Humanities</i>
IAff 93	<i>Africa: Problems and Prospects</i>
Phil 125	<i>Philosophy of Race and Gender</i>
PSc 182	<i>African International Politics</i>
PSc 186	<i>U.S. Policies Toward Sub-Saharan Africa</i>
Soc 179	<i>Race and Minority Relations</i>

AMERICAN STUDIES

Professors B.M. Mergen, J.M. Vlach, J.O. Horton, R.W. Longstreth, J.A. Miller, P.M. Palmer

Associate Professor T.A. Murphy (Chair)

Assistant Professors M. McAlister, C. Heap

Adjunct Associate Professors B.G. Carson, E. Mayo

Associate Professorial Lecturers R.D. Wagner, D.P. Tiller, O. Ridout

Bachelor of Arts with a major in American studies—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—AmSt 71-72 or Hist 71-72 or equivalent.
3. Required courses in related areas—Two semesters of foreign language or placement into a Level Three foreign language by examination; also, one course about a foreign culture selected from the CCAS list of foreign cultures or approved by the Department.
4. Requirements for the major—two 100-level U.S. history courses (one with a significant focus on the pre-20th century, the other primarily focused on the 20th century): AmSt 168, 179-180, and five courses in the student's concentration. Areas of concentration are a) diversity and difference, b) the built environment and urban and regional spaces; and c) cultural analysis. A list of appropriate courses for each concentration is maintained by the department. At least two of the five courses in the area of concentration must be cross-listed in American studies.

In all cases of AmSt courses that are cross-listed with other University departments, students may register for the course in either department. With approval, other pertinent upper-level courses may be used to fulfill group requirements, including Topics courses on appropriate subjects.

Special Honors—For Special Honors in American studies, a major must meet the special honors requirements stated under University Regulations, be recommended by the faculty, and receive a grade of A on the senior paper, which is written as part of AmSt 180.

Minor in American studies—Required: 18 credit hours of 100-level courses, including AmSt 167 or 168, and two 100-level U.S. history courses, one of which is focused primarily on pre-20th century and the other primarily on 20th-century material.

50 Washington, D.C.: History, Culture, and Politics (3)

Staff

Introduction to interdisciplinary methods of studying the contemporary city. Major problems of metropolitan life, past and present, analyzed by faculty and community leaders. Emphasis on experiential team projects. Same as Hist 50. (Fall)

- 71-72 **Introduction to American Studies (3-3)** Mergen, Murphy, Palmer, McAlister
Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance. (Academic year)

- 139-40 **Women in the United States (3-3)** Harrison, Murphy
Survey of women's experience in U.S. history, the way gender has organized relations of power, and the impact of race, region, class, and ethnicity on women and on gender roles. Same as Hist/WStu 139-40. (Academic year)
- 144 **Explorations in Historical Geography (3)** Staff
Examination of selected themes in the cultural geography of the United States over the course of its history, in relation to an overview of the historical geography of the country. Same as Geog 144. (Spring)
- 145 **Folk Arts in America (3)** Vlach
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts. Same as AH 145.
- 160 **Material Culture in America (3)** Vlach
Review and analysis of the cultural messages embedded in our material surroundings. Consideration of a range of humanly created artifacts, ranging from specific objects to vast landscapes.
- 165 **Introduction to Folklore (3)** Vlach
Survey of the forms of folk expression, including verbal art, music, dance, and material culture. Examination of the materials and methods of folklore research. Same as Anth 192.
- 167 **Themes in U.S. Cultural History (3)** Mergen, McAlister
An examination of the special ideas, values, and modes of expression that have made American life distinctive, as revealed through a variety of sources, including fiction, popular media, photography and the arts, and material culture. May be repeated for credit provided the topic differs. Same as Hist 167.
- 168 **Cultural Criticism in America (3)** McAlister, Heap
A variety of approaches to cultural criticism, encompassing the nature of aesthetic accomplishment as well as the social contexts that alter and enrich the shape of cultural expression. The significance of culture to politics, social life, and the development of individual and collective identities. Limited to majors. (Fall)
- 171-72 **U.S. Social History (3-3)** Horton, Stott
AmSt 171: Daily life, institutions, intellectual and artistic achievements of the agrarian era, 1607-1861. AmSt 172: The urban-industrial era from 1861 to present. Same as Hist 171-72. (Academic year)
- 173 **African American History (3)** Alexander
Same as Hist 173.
- 174 **Special Topics in African American History (3)** Horton
Concentration on specific issues central to the African American experience. Consult the *Schedule of Classes* for issues to be addressed. Same as Hist 174. (Spring)
- 175-76 **American Architecture (3-3)** Longstreth
Stylistic properties, form and type characteristics, technological developments, and urbanistic patterns are introduced as a means of interpretation of historic meaning. Buildings are analyzed both as artifacts and as signifiers of social, cultural, and economic tendencies. AmSt 175: 1600-1860; AmSt 176: 1860-present. Same as AH 176 and 191. (Academic year)
- 179 **Practicum in American Studies (3)** Staff
For American studies majors in their senior year. Supervised assignments in public or private agencies engaged in the investigation, interpretation, or conservation of the social, material, and expressive elements that constitute American culture. Biweekly seminar on campus. (Fall)
- 180 **Proseminar in American Studies (3)** Staff
For American studies majors in their senior year. Directed research and writing in preparation for public symposium at the end of the academic year. (Spring)
- 185 **Black Women in U.S. History (3)** Alexander
Same as Hist/WStu 185.
- 186 **U.S. Urban History (3)** Stott, Heap
History of the American city from colonial foundations to the present, focusing on relationships between social and economic forces with physical form. Special emphasis on transitions from pre-industrial to industrial to metropolitan

- forms, with attention to implications for public policy and historic preservation.
Same as Hist 186. (Fall)
- 187 **Building Cities** (3) McGrath
Same as Geog 187.
- 192 **The American Cinema** (3) Mergen
History and criticism of American films. The course will enable the student to recognize and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture.
Same as AH 192. (Spring)
- 193 **Archaeology Field/Laboratory Research** (3) Brooks
Same as Anth 113.
- 194 **Historical Archaeology** (3) Staff
Same as Anth 187.
- 195 **Independent Study** (1 to 3) Staff
Open to a limited number of American studies majors as directed research or as an internship with a Washington museum or historical society. Approval of advisor required. (Fall and spring)
- 197 **Oral History and Interview Techniques** (3) Mergen
Introduction to theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area. Same as Anth/Hist 197. (Summer)
- 198 **Special Topics** (3) Staff
May be repeated for credit provided the topic differs. Admission by permission of instructor.

ANTHROPOLOGY

Professors A.S. Brooks (*Chair*), C.J. Allen, J.M. Vlach, D. Gow, B. Wood, J.C. Kuipers, B.D. Miller, D. Bell, R.R. Grinker
Assistant Professors A. Balkansky, S.C. Lubkemann
Adjunct Associate Professors C.R. Rose, P.I. Cressey
Professorial Lecturers D.H. Ubelaker, R. Potts, G. Teleki
Associate Professorial Lecturers D.W. von Endt, I. Love
Assistant Professorial Lecturers J.P. Homiak, J. Humphrey

Bachelor of Arts with a major in anthropology—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. **Prerequisite courses**—Anth 1, 2, 3, and 4.
3. **Required courses in other areas**—(a) two-year proficiency in French, German, Russian, or Spanish (or another language approved by the Anthropology Department); (b) 6–12 credit hours of course work in related departments approved by the advisor. Recommended for ethnological emphasis are courses in economics, political science, psychology, religion, and sociology; for archaeological emphasis, courses in American studies, art history, geography, geology, and history; for emphasis in biological anthropology, courses in anatomy and biological sciences; for emphasis in linguistic anthropology, courses in linguistics and in speech and hearing. Courses in statistics are strongly recommended for all anthropology majors.
4. **Requirements for the major**—In addition to the four prerequisite courses, 24–36 credit hours in anthropology courses, including Anth 198 and at least one course from each of the following five categories: aspects of culture (courses numbered in the 150s as well as 117, 121, 191, 192, and 193); linguistics (courses numbered in the 160s); ethnology (courses numbered in the 170s); biological anthropology (courses numbered in the 140s); and archaeology (courses numbered in the 180s and 113, 114, 115). Qualified seniors may enroll in 200-level seminar courses with the permission of the instructor. See the Graduate Programs Bulletin. Up to 6 credit hours of ethnographic or archaeological field school credit may be accepted and applied toward the major, if approved by the department, and majors are encouraged to participate in such programs. Opportunities are available for field and laboratory research, both within the department and as internships in the Washington area. Credit for such work (not to exceed one-quarter of the student's total second-group credit hours in anthropology) may be granted through registration in Anth 195.

Bachelor of Arts with a major in archaeology—An interdepartmental major offered by the Anthropology Department in cooperation with the Fine Arts and Art History Department. The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Required courses in other areas: second-year proficiency in French, German, Latin, Greek, or a Near Eastern language. Further language study is strongly encouraged. Since graduate study in archaeology usually involves broader preparation and requires knowledge of at least one classical and one modern language, students intending to pursue graduate study should consult with the departmental advisor as early as possible in their undergraduate programs.
3. Required courses in the major: Anthropological archaeology—Anth 3 and 12 additional hours chosen from anthropology courses numbered in the 180s or 113; at least 3 hours must be in New World archaeology (182, 185, 186) and at least 3 hours must be in Old World archaeology (181, 183, 184, 188); students are urged to take 3 hours of archaeological fieldwork, such as Anth 114 or 115. Classical archaeology—6 hours chosen from AH 111, 112, 155. Ancient Civilizations—15 hours chosen from AH 101, 102, 147; Clas 71, 72, 107, 108, 113, 170; and Hist 107, 108, 109, 110; at least 3 hours must be taken in each discipline (classics, art history, history). Electives—3 to 12 hours of additional courses from the above lists, or other related courses in anthropology, art, classics, and history.

Special Honors—For Special Honors in anthropology or archaeology, a major must meet the special honors requirements stated under University Regulations, register for 3 credit hours of Anth 195, Undergraduate Research, and write a paper of special distinction arising out of a program of directed reading or research.

Minor in general anthropology—21 credit hours are required, including Anth 1, 2, 3, 4, 198, and two additional courses in anthropology, which must be taken in different subdisciplines. For the purposes of this minor, the department's courses may be divided into subdisciplines as follows: biological anthropology—courses in the 140s; archaeology—courses in the 180s and 113; anthropological linguistics—courses numbered in the 160s; sociocultural anthropology—all other 100-level courses, with the exception of Anth 195 and 196, in which the topic is variable.

Minor in archaeology—18 credit hours are required, including Anth 3, four courses chosen from courses in the 180s and 113; an approved field or research course or a fifth course chosen from the preceding list.

Minor in biological anthropology—16–19 credit hours are required, including Anth 1, 145, 146, 147, and 148; an approved field or research course or an approved course or course sequence in a related field (including biological sciences, geology, psychology, statistics, and certain other disciplines).

Minor in sociocultural anthropology—18 credit hours are required, including Anth 2 and 198; one course in ethnography (Anth 170–179); three courses in aspects of culture or methods (Anth 20, 113, 150–159, or 191–193).

Minor in cross-cultural communication—18 credit hours are required, including Anth 2 or 4, 161, 162; Anth 150 or 159; one course in ethnography (Anth 170–179); one course chosen from Anth 153, 154, 155, 158, 168, 192, or 193.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

1 Biological Anthropology (4)

Brooks and Staff

Survey of human evolution, genetics and physical variation, and primatology. Frequent laboratory exercises. Laboratory fee, \$40. (Fall and spring)

2 Sociocultural Anthropology (3)

Allen, Grinker, Miller

Survey of the world's cultures, illustrating the principles of cultural behavior. (Fall and spring)

3 Archaeology (3)

Balkansky

Introduction to archaeological survey and excavation techniques and laboratory methods of dating and analysis. Brief history of archaeology and survey of world prehistory. Films and laboratory exercises. (Fall and spring)

4 Language in Culture and Society (3)

Kuipers

Comparison and analysis of how cultures use language to communicate. The relationship of language to issues of human nature, gender, race, class, artistic expression, and power. Laboratory fee, \$20. (Spring)

- 113 Archaeology Field/Laboratory Research (3)** Brooks, Cressey
Field and/or laboratory techniques and interpretation. Topics may include excavation methods, recording photography, preservation, stratigraphy and environmental reconstruction, typology, ceramic analysis, use-wear analysis, and spatial analysis. Specific research area and topics announced in the *Summer Sessions Announcement*. Same as AmSt 193. (Summer)
- 114 Paleoanthropological Field Program (3 or 6)** Brooks
Intensive course on field research in paleoanthropology, including excavation methods, identification and analysis of materials, paleoecology, archaeology, and human anatomy. Conducted at selected sites in Eurasia, Africa, or Australia. Visits to comparative sites and collections in the region. (Summer)
- 115 Mesoamerican Field Program (3 or 6)** Balkansky
Archaeological field study in Mexico or Central America. For specific location and focus, see the *Summer Sessions Announcement*. (Summer)
- 117 Methods in Sociocultural Anthropology (3)** Grinker, Kuipers
Approaches to field research. Conceptual bases and biases in the delineation of problems and in the selection, analysis, and organization of data. Students will design and carry out their own field projects in the Washington area. Prerequisite: Anth 2. (Spring)
- 121 The Anthropology of Gender: Cross-Cultural Perspectives (3)** Bell and Staff
Same as WStu 121.
- 141 Functional and Developmental Musculoskeletal Anatomy (3)** Staff
Growth and function of the human musculoskeletal system. Skeletal tissue development, anatomy, and histology; biomechanics of muscle and skeletal tissue; craniofacial growth and development; and the functional morphology of chewing, respiration, vocalization, and locomotion. No prior knowledge of anatomy is required. Laboratory fee, \$50. Prerequisite: Anth 1. (Fall)
- 142 Human Evolutionary Anatomy (3)** Wood and Staff
The structure and function of human muscular and skeletal anatomy, as compared to our closest relatives, the great apes. Using this comparative approach, the course investigates the fossil record of human evolution, with an emphasis on reconstructing relationships, function, behavior, and adaptation in fossil hominids. Prerequisite: Anth 1. (Spring)
- 145 Forensic Anthropology Laboratory (2)** Ubelaker
Identification of human skeletal remains by body part, age, sex, race, and individual disease or trauma history; study of skeletal variation in modern and recent populations. Taught at the Smithsonian. Corequisite: Anth 146. (Spring)
- 146 Human Variation (1)** Ubelaker
An overview of human variation, with special emphasis on the skeleton. Includes history of physical anthropology, individual and population variations, archaeological recovery of human remains, paleodemography, growth, paleopathology, and forensic anthropology. Same as Anat 252. Prerequisite: Anth 1; corequisite for undergraduates: Anth 145. (Spring)
- 147 Hominid Evolution (3)** Wood
The fossil record of hominid evolution considered in the light of evolutionary theory. Brief review of the earlier human antecedents, with concentration on the Pleistocene remains. Laboratory fee, \$40. Prerequisite: Anth 1. (Fall)
- 148 Primatology (3)** Staff
Physical and behavioral characteristics of the various primate groups and their relationship to human physical and cultural evolution. Prerequisite: Anth 1. (Fall)
- 149 Topics in Biological Anthropology (3)** Wood and Staff
Topic announced in the *Schedule of Classes*. Instructors will be drawn from GW faculty and Smithsonian Institution staff. May be repeated for credit if topic varies.
- 150 Human Rights and Ethics (3)** Bell and Staff
Issues of basic human rights and their violation by different cultures, states, and organizations. Genocide, ecocide, abuses on the basis of ethnicity, religion, or similar factors, and the treatment of those seeking asylum. Rights of informants and groups studied in anthropological research.

- 151 Development Anthropology (3)** Staff
The impact of the world economy on nonindustrial societies. Analysis of the role of anthropology in international development programs aimed at alleviating problems in the Third World. Prerequisite: Anth 2. (Fall)
- 152 Cultural Ecology (3)** Balkansky
Basic principles of cultural ecology. Human interaction with the ecosystem both past and present; emphasis on the application of anthropological precepts to current environmental problems.
- 153 Psychological Anthropology (3)** Staff
The cross-cultural study of the relationship between culture and personality. Topics include emotion, conceptions of the self, mental health and illness, sexuality, marriage and parenting, and cognition. Psychobiological, cultural, ecological, and psychoanalytical theories are examined. Prerequisite: Anth 2 or permission of instructor. (Spring, alternate years)
- 154 Illness, Healing, and Culture (3)** Miller
Introduction to medical anthropology. What the record of human evolution and prehistory tells about human health; the epidemiology of health and illness; how different cultures define disease; understanding illness and healing systems cross-culturally; the political economy of illness; and the role of medical anthropology in health care and international development.
- 155 Religion, Myth, and Magic (3)** Allen
Theories of religion developed by anthropologists; survey of world religions with emphasis on non-Western societies; religious processes and change. Same as Rel 155.
- 156 Politics, Ethnicity, and Nationalism (3)** Grinker
Comparative analysis of political systems; political processes, such as factionalism, styles of leadership, political ritual. Prerequisite: Anth 2 or permission of instructor. (Fall, alternate years)
- 157 Kinship, Family, and Community (3)** Bell, Grinker
Cross-cultural analysis of how people form, maintain, and transform social groups and boundaries. Focus on how communities such as family, ethnic group, and nation are defined in moral terms. (Fall, alternate years)
- 158 Art and Culture (3)** Allen
The role of art in culture, with emphasis on small-scale societies; influences upon the artist, and beliefs and practices associated with art production. Prerequisite: Anth 2 or permission of instructor.
- 159 Symbolic Anthropology (3)** Allen
The study of culture through the analysis of symbolic systems including myth, cosmology, folklore, art, ritual, political symbolism, and the symbolic study of kinship. Prerequisite: Anth 2 or permission of instructor. (Fall, alternate years)
- 161 Language, Culture, and Cognition (3)** Kuipers
The role of language and culture in the organization of human experience. Beginning with debates about linguistic relativity, the course explores the way language use shapes cognition and practice in a variety of cultures and social contexts. Prerequisite: Anth 4. Laboratory fee, \$20. (Fall, alternate years)
- 162 Ethnographic Analysis of Speech (3)** Kuipers
Linguistic variation and change in discourse practices; social and political correlates of linguistic interaction; recording, transcription, and analysis of verbal interaction. Prerequisite: Anth 4. Laboratory fee, \$40. (Fall, alternate years)
- 163 Psycholinguistics (3)** Staff
Same as Ling 102.
- 168 Language and Linguistic Analysis (3)** Tyndall and Staff
Same as Ling 101. (Spring)
- 169 Special Topics in Linguistic Anthropology (3)** Kuipers and Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 170 Cultures of the Caribbean (3)** Staff
Culture history and ways of life among the area's various cultural groups up to the ethnographic present. Prerequisite: Anth 2 or permission of instructor.
- 171 North American Native Peoples (3)** Staff
Comparative study of Indian groups representative of the different culture areas of the United States and Canada. Contemporary issues involving indigenous

- groups, the wider society, and the state. Prerequisite: Anth 2 or permission of instructor. (Fall, alternate years)
- 172 **Cultures of Central and South America** (3) Allen
Culture history and ways of life in a selected region of Central or South America. Regional focus to be announced in the *Schedule of Classes*. Prerequisite: Anth 2 or permission of instructor. (Fall)
- 173 **Cultures of the Pacific** (3) Love
Culture history and ways of life among native peoples of Melanesia, Micronesia, and Polynesia. Prerequisite: Anth 2 or permission of instructor.
- 174 **Cultures of Southeast Asia** (3) Kuipers
Introduction to the history, art, ecology, and politics of Southeast Asia. Comparison and interpretation of recent ethnographic case studies, archaeological evidence, and current political events in order to understand the diversity of Southeast Asian traditions. (Spring, alternate years)
- 175 **East Asian Ethnography** (3) Staff
Intensive study of the culture and history of selected East Asian peoples. Specific area to be announced in the *Schedule of Classes*. May be repeated for credit. Prerequisite: Anth 2 or permission of instructor.
- 177 **Cultures of the Near East** (3) Staff
Geographic environment, language, religion, and social structure of settled and nomadic peoples of the Near East: emphasis on the Arab world. Prerequisite: Anth 2. (Fall)
- 178 **Cultures of Africa** (3) Grinker
Comparative examination of the history, cultural development, and contemporary problems of sub-Saharan African cultures. New World African cultures are also considered. Prerequisite: Anth 2 or permission of instructor.
- 179 **Japanese Culture Through Film** (3) Hamano
Same as Japn 162. (Spring)
- 180 **Ethnohistory** (3) Staff
Reconstruction of the history of a selected preliterate society through the analysis of historical documents, oral traditions, archaeological remains, and other indirect sources. Specific topic to be announced in the *Schedule of Classes*.
- 181 **African Roots from *Australopithecus* to Zimbabwe** (3) Brooks
The development and contributions of Africa from human beginnings through medieval states. Topics include human evolution, origins of art, technology, trade, and animal/plant domestication, rise of African states, early relations with Europe and Asia, antecedents of contemporary African diversity. Prerequisite: Engl 11 or 13. (Spring)
- 182 **Archaeology of North America** (3) Staff
History of American archaeology; survey of North American culture history from human entry into the Americas during the Pleistocene period until the time of the first European contacts. Focus on peoples north of Mexico. Prerequisite: Anth 3.
- 183 **Old World Prehistory: Paleolithic and Mesolithic** (3) Brooks
Survey of prehistory in Europe, Africa, and Asia from the earliest hominid cultures to the beginnings of agriculture. Prerequisite: Anth 3. (Fall)
- 184 **Old World Prehistory: Neolithic and Bronze Age** (3) Staff
Survey of prehistory in the Near East, Egypt, Europe, and other areas, from the beginnings of agriculture to the rise of Babylon. Prerequisite: Anth 3. (Spring)
- 185 **Archaeology of Mesoamerica** (3) Balkansky
Culture history of pre-Columbian Mexico and Central America from the Paleo-Indian period through the Spanish Conquest. Prerequisite: Anth 3.
- 186 **Archaeology of South America** (3) Staff
Culture history of pre-Columbian South America, with a focus on the Andes from the Paleo-Indian period through the Spanish Conquest. Prerequisite: Anth 3.
- 187 **Historical Archaeology** (3) Cressey
Survey of the basic data and methods of research in the material culture of recent history. Same as AmSt 194.
- 188 **Archaeology of Israel and Neighboring Lands** (3) Cline
Same as AH 193.

- 189 Special Topics in Archaeology (3)** Balkansky and Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 190 Cultures and Diasporas in the Americas (3)** Staff
Voluntarily and forcibly displaced and resettled peoples in the Americas, including the earliest settlers, slaves, immigrants, refugees, migrant workers, illegal aliens, tourists, and others are studied in local, transnational, and global contexts. Culture change and ethnic identity formation among resettled groups: repatriation. Prerequisite: Anth 2 or permission of instructor.
- 191 Anthropology in Performance (3)** Garner, Allen
Exploration of the relationships among social interaction, ritual, and dramatic performance. Improvisation workshops and discussion based on readings about non-Western cultures. Same as TrDa 140. (Spring)
- 192 Introduction to Folklore (3)** Vlach
Survey of the forms of folk expression, including verbal art, music, dance, and material culture, and the interaction between folk forms and popular culture. Examination of the materials and methods of folklore research. Same as AmSt 165.
- 193 Ethnographic Film (3)** Homiak
Still and motion-picture photography as an integral aspect of anthropological research. A study of recent and historic ethnographic films and an introduction to the forms and methods of making visual ethnographic records. Prerequisite: Anth 2 or permission of instructor. Material fee, \$20.
- 195 Undergraduate Research (arr.)** Staff
Individual research problems to be arranged with a member of the faculty. May be repeated for credit. Prerequisite: Appropriate introductory course or permission of instructor.
- 196 Special Topics (3)** Staff
Courses offered by visiting faculty; experimental offerings. Topic to be announced in the *Schedule of Classes*. May be repeated for credit.
- 197 Oral History and Interview Techniques (3)** Staff
Same as AmSt/Hist 197. (Summer)
- 198 Foundations of Anthropology (3)** Allen, Grinker
The development of anthropological thought as seen in historical context. Exploration of selected basic concepts and theories of contemporary anthropology. To be taken in the junior or senior year. Prerequisite: Anth 2. (Spring)

APPLIED SCIENCE

Interdepartmental course offerings in the School of Engineering and Applied Science.

- 57 Analytical Mechanics I (2)** Jones, Haque, Shames
First half of a one-year sequence. Concepts of statics: force systems, conditions of force and moment equilibrium, simple structures, distributed forces, centroids, internal forces, friction, moments of inertia. Prerequisite or concurrent registration: ApSc 113, Phys 21. (Fall and spring)
- 58 Analytical Mechanics II (3)** Haque, Shames
Second half of a one-year sequence. Concepts of dynamics: kinematics of particles, velocity and acceleration, translating and rotating reference frames, particle dynamics, motion under central and electromagnetic force, effect of Earth's rotation, vibrations, work, kinetic and potential energy, dynamics of systems of particles. Prerequisite: ApSc 57. (Fall and spring)
- 113 Engineering Analysis I (3)** Haque, Lee
Analytical methods for the solution of problems in engineering, the physical sciences, and applied mathematics: applications of ordinary differential equations, matrices and determinants, eigenvalues and eigenvectors, systems of ordinary linear differential equations, Bessel and Legendre functions. Prerequisite or concurrent registration: Math 33. (Fall and spring)
- 114 Engineering Analysis II (3)** Kahn and Staff
Analytical methods for the solution of problems in engineering, the physical sciences, and applied mathematics: complex variables, Fourier series and integral, frequency filters, Laplace transforms, inversion and Duhamel integrals; partial differential equations. Prerequisite: ApSc 113. (Fall and spring)

- 115 Engineering Analysis III (3)** van Dorp and Staff
 Analytical methods for the solution of engineering problems using concepts from probability and statistics: probability modeling, random variables and their distributions, mathematical expectation, sampling, point and confidence interval estimation, hypothesis testing, correlation, regression, and engineering applications. Prerequisite: Math 32; Engl 9 or 10. (Fall, spring, and summer)
- 116 Engineering Analysis IV (3)** Soland and Staff
 Analytical methods using advanced concepts from probability and statistics: multivariate distributions, expectation, generating functions, parametric families of distributions, sampling and sufficient statistics, estimation, hypothesis testing, and engineering applications. Prerequisite: ApSc 115, Math 33. May be taken for graduate credit. (Fall)
- 130 Materials Science (3)** Gilmore, Haque
 Structure of perfect and imperfect solids, thermodynamics of solids, reaction rate theory, electrons in solids, electron transport, electrical properties of junctions, magnetic materials, optical properties of materials. Prerequisite: Chem 11, Math 33, Phys 22. (Fall and spring)
- 199 Honors Research Project and Seminar (3)** Staff
 Student designs and carries out a research project under the supervision of a faculty advisor. Students from all engineering disciplines meet periodically to present projects and discuss results. Enrollment limited to students admitted to the Honors Research Program. May be repeated for credit.

ARABIC

See **Classical and Semitic Languages and Literatures**.

ARCHAEOLOGY

See **Anthropology**.

ART

See **Fine Arts and Art History**.

ASIAN STUDIES

Program Committee: M. Mochizuki (*Director*), A. Bowie, B. Dickson, Y.-K. Kim-Renaud, E. McCord, D. Yang

The Elliott School of International Affairs offers a multidisciplinary program leading to a Bachelor of Arts with a major in Asian studies.

Bachelor of Arts with a major in Asian studies—The following requirements must be fulfilled.

1. The general curriculum requirements stated under the Elliott School of International Affairs.
2. Required courses for the major—Econ 169 or 170; three courses selected from Hist 101, 118, 187, 188, 189, 190, 195, or 196; IAff 91; two courses selected from PSc 170, 173, or 175; one course in Asian literature; and three 100-level Asia-related courses, selected in consultation with the program director.
3. Completion of third-year-level language study in an approved Asian language (through Chin 11, Jpn 8, or Kor 6).

Special Honors—In addition to the general requirements stated under University Regulations, a candidate for Special Honors in Asian studies must have attained a 3.4 grade-point average overall and complete either an Elliott School or Honors senior seminar or a senior thesis. Students must apply for honors candidacy prior to the beginning of the senior year.

Students should consult the program guidelines available from the Elliott School for courses pertinent to Asian studies. Students should consult the program director concerning certain Special Topics or Selected Topics courses that may also be part of this program.

BIOLOGICAL SCIENCES

Professors R.K. Packer, R. Donaldson (*Chair*), J.R. Burns, D.L. Lipscomb, R.E. Knowlton
Associate Professors H. Merchant, D.E. Johnson, K.M. Brown, J.M. Clark, M.W. Allard,
 L.C. Smith, F.J. Turano

Assistant Professors E.F. Wells, D.W. Morris, G. Hormiga, P.S. Herendeen, P. Hernandez
Professorial Lecturer R.P. Eckerlin

Associate Professorial Lecturer P.E. Spiegler

Bachelor of Arts with a major in biology—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses—BiSc 13–14 or equivalent.
3. Required courses in related areas: Chem 11–12, 151–52, and 153–54. (The following courses are strongly recommended: Phys 1–2 or 21–22; 3 credit hours of either mathematics or statistics; two years of an approved foreign language.)
4. Required courses for the major—A minimum of 24 credit hours of 100-level courses, which must include at least 4 hours from each of the following: cell and molecular biology (BiSc 102 to 109), suborganismal biology (BiSc 110 to 128), organismal biology (BiSc 130 to 145), and ecology and evolution (BiSc 150 to 169).

Bachelor of Science with a major in biology—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses—BiSc 13–14 or equivalent.
3. Required courses in related areas—Chem 11–12, 151–52, and 153–54; Phys 1–2 or 21–22; 3 credit hours of either mathematics or statistics (this requirement cannot be satisfied by waiver). Two years of an approved foreign language are strongly recommended but not required.
4. Required courses for the major—A minimum of 30 credit hours of 100-level courses, which must include at least 4 hours from each of the following: cell and molecular biology (BiSc 102 to 109), suborganismal biology (BiSc 110 to 128), organismal biology (BiSc 130 to 145), and ecology and evolution (BiSc 150 to 169).

A maximum of 6 credit hours of research and independent study or graduate courses in biological sciences may be used as electives within the major.

Special Honors—In addition to the general requirements stated under *University Regulations*, in order to be considered for graduation with special honors, a student must maintain a cumulative 3.5 grade-point average in biological science courses and at least a 3.0 cumulative overall grade-point average. Students who meet these criteria and wish to pursue special honors must complete an approved research project under faculty direction.

Minor in biology—12 credit hours of 100-level courses (excluding research and independent study).

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the *Graduate Programs Bulletin* for course listings.

Departmental prerequisite: BiSc 13–14 or equivalent is prerequisite to all 100-level courses except by permission of the instructor.

3 The Diversity of Life (3)

Lecture (2 hours), laboratory (2 hours). Characteristics of the living world, including evolution; diversity of plants, animals, and microorganisms; ecology and the biosphere; animal behavior; and the biology of the human body. Laboratory fee, \$45. (Fall)

Lipscomb, Burns

4 The Building Blocks of Life (3)

Lecture (2 hours), laboratory (2 hours). The molecules and cells that make up the human organism, nutrition and metabolism, inheritance and genetic diseases, bacterial and viral infections, immunity, biotechnology in medicine and food, economics and politics of biology. Laboratory fee, \$45. (Spring)

Packer, Donaldson

13 Introductory Biology: The Biology of Organisms (4)

Lecture (3 hours), laboratory (3 hours). Concepts and methods in the study of whole organisms. Evolutionary theory; population biology; diversity of plants, animals, fungi, and microorganisms; ecology and behavior; and animal structure and function. Laboratory fee, \$55. (Fall)

Lipscomb, Burns

- 14 Introductory Biology: Cells and Molecules (4)** Packer, Donaldson
Lecture (3 hours), laboratory (3 hours). Nutrition and metabolism, cellular physiology, genetics, and molecular biology of plants and animals. Laboratory fee, \$55. (Spring)
- 102 Cell Biology (3)** Morris, Smith
Structure and function of biological molecules and cellular organelles; cellular interactions. Prerequisite: one semester of organic chemistry. (Fall and spring)
- 103 Biochemistry (4)** Vanderhoek
Introduction to structures of biological macromolecules, enzyme catalysis, cellular bioenergetics, and metabolism. Prerequisite: Chem 151-52. Same as Bioc 101 and Chem 161. (Fall)
- 104 Biochemistry Laboratory (2)** Vanderhoek
Study of common experimental techniques used in life science laboratories to separate and characterize biological macromolecules. Prerequisite: BiSc 103 or equivalent. Laboratory fee, \$75. Same as Bioc 103 and Chem 163. (Spring)
- 105 Plant Biochemistry (3)** Donaldson
Discussions of plant metabolism and molecular biology: photosynthesis, nitrogen metabolism, membrane transport, mechanisms of hormone action, protein targeting, biotechnology, and current research topics. Prerequisite: Chem 11-12. (Spring)
- 106 Special Topics in Biochemistry (2)** Vanderhoek, Donaldson, King
In-depth discussion of current biochemically relevant topics, including cancer and HIV chemotherapy, immune response, photosynthesis, signal transduction, hormone regulation and nutrition. Topics vary. Prerequisite: BiSc 103 or equivalent. Same as Bioc 102 and Chem 162. (Spring)
- 107 Genetics (3)** Johnson
Introduction to genetics, with emphasis on the integration of transmission of genetic traits and the molecular basis of gene action. Also includes cytogenetics, gene regulation, and examples of current applications of genetic technology. (Fall and spring)
- 108 Genetics Laboratory (1)** Johnson
Study of genetic principles and genetic and molecular techniques in *Drosophila* and *E. coli*. Prerequisite or concurrent registration: BiSc 107. Laboratory fee, \$55. (Spring)
- 109 Molecular Biology (4)** Turano
Overview of theories, techniques, and procedures associated with molecular biology; topics include the biosynthesis of DNA, RNA, and proteins, relationships among structure, function, and expression; and traditional and modern methods of gene and protein characterization and monitoring. Prerequisite: Chem 11-12. Laboratory fee, \$55. (Fall)
- 110 Developmental Plant Anatomy (4)** Hufford
Demonstration, observation, discussion (6 hours). Initiation and ontogeny of tissues and organs of vascular plants. Laboratory fee, \$55. (Spring, odd years)
- 114 Developmental Biology (4)** Brown
Lecture (2 hours), laboratory (4 hours). Embryonic development of animals. Principles are illustrated by modern experimental studies of developmental problems. Laboratory analysis of organ system formation in the sea urchin, frog, chicken, and pig. Laboratory fee, \$55. (Fall)
- 115 Experimental Developmental Biology (4)** Brown
Lecture (2 hours), laboratory (4 hours). Cell biochemistry and molecular biology of development. Laboratory exercises involve micromanipulative, biochemical, and molecular studies on animal embryos cultured in the lab. Prerequisite: BiSc 114 or equivalent, or permission of instructor. Laboratory fee, \$55. (Spring, odd years)
- 118 Histology (4)** Burns
Lecture (2 hours), laboratory (4 hours). Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Laboratory fee, \$55. (Spring)
- 120 Survey of Neurobiology (4)** Staff
Lecture (3 hours), laboratory (2 hours). Study of the gross and cellular anatomy, physiology, and biochemistry of the nervous system and its pathways; emphasis on mammals. Laboratory fee, \$55. (Fall)

- 121 **Comparative Endocrinology** (3) Packer
Basic principles of chemical integration, neuroendocrine relationships, and mechanisms of hormone action. Prerequisite: BiSc 118 or 122. (Spring)
- 122 **Human Physiology** (3) Packer
Introduction to the function of organ systems of the human body. Prerequisite: Chem 11-12. (Fall)
- 123 **Human Physiology Laboratory** (1) Staff
Study of basic physiology laboratory techniques; emphasis on the experimental study of homeostatic mechanisms in humans. Prerequisite or concurrent registration: BiSc 122. Laboratory fee, \$55. (Fall)
- 125 **Environmental Physiology** (3) Packer
Mechanisms of evolutionary adaptation and processes of acclimation by which animals respond to environmental challenges; emphasis on vertebrates. Prerequisite: BiSc 122 or 154. (Fall)
- 128 **Human Nutrition** (3) Staff
Dietary requirements and their underlying physiological and biochemical bases; composition of natural and modified foodstuffs and additives; social and economic aspects of nutrition. (Spring)
- 130 **Invertebrate Zoology** (4) Knowlton
Lecture (3 hours), laboratory (3 hours). General survey of invertebrate animals, including classification, morphology, physiology, embryology, and evolutionary relationships among phyla. Laboratory fee, \$55. (Fall)
- 132 **Comparative Vertebrate Anatomy** (4) Staff
Lecture (2 hours), laboratory (4 hours). Evolution and comparative morphology of Phylum Chordata, stressing recent forms. Laboratory fee, \$55. (Spring)
- 137 **Introductory Microbiology** (4) Morris
Lecture (2 hours), laboratory (4 hours). Survey of the major groups of microorganisms with emphasis on structure, physiology, ecology, pathogenesis, and biotechnology. Antibiotic resistance and emerging diseases. Prerequisite: one year of chemistry. Laboratory fee, \$55. (Fall)
- 139 **Parasitology** (4) Eckerlin
Lecture (2 hours), laboratory (4 hours). Introduction to animal parasitology; survey of parasitic types from protozoa through arthropods. Laboratory fee, \$55. (Fall)
- 140 **Taxonomy of Flowering Plants** (4) Wells
Lecture (2 hours), laboratory and field (4 hours). Origin, evolutionary development, and principles of systematics of flowering plants. Laboratory fee, \$55. (Spring, even years)
- 142 **Flora of the Mid-Atlantic States** (4) Wells
Field trips and laboratory study of the identification and ecology of vascular plants of the Coastal Plain, Piedmont, and mountains of Delaware, Maryland, Virginia, and West Virginia. Emphasis on family characteristics and recognition of dominant species in native habitats. Laboratory fee, \$55. (Summer)
- 150 **Organic Evolution** (3) Lipscomb
Synthetic theory of organic evolution, including population biology, speciation, adaptation, macroevolution, systematics, biogeography, and the geologic record. (Fall)
- 151 **History of Life** (3) Lipscomb
A review of the origin of life, the geologic record, and the evolutionary history of the major groups of organisms, including the evolution of bacteria, origin of animals and plants, evolution of invertebrates and vertebrates, adaptations of mammals, and the evolution of flowering plants. (Spring, odd years)
- 152 **Animal Behavior** (3) Staff
An evolutionary approach to the study of animal behavior, emphasizing behavioral ecology and sociobiology. (Spring)
- 154 **General Ecology** (4) Merchant
Lecture (3 hours), laboratory and field (3 hours). Introduction to the concepts of limiting factors, biogeochemical cycles, trophic levels, and energy transfer and their relationship to the structure and function of population, species, communities, and ecosystems. Laboratory fee, \$55. (Fall)
- 155 **Plant Ecology** (4) Wells
Lecture (2 hours), laboratory (4 hours). Introduction to the dynamics of plant populations, communities, and individuals. Two weekend field trips required. Laboratory fee, \$55. (Fall, odd years)

- 156 Animal Ecology (4)** Merchant
Lecture (3 hours), laboratory and field (3 hours). Application of ecological principles to the understanding and manipulation of animal populations. Prerequisite: BiSc 154 or permission of instructor. Laboratory fee, \$55. (Spring, even years)
- 157 Aquatic Ecology (4)** Merchant
Lecture (3 hours), laboratory and field (3 hours). Ecological principles applied to aquatic systems with special references to physiochemical properties, typical habitats, and communities. Laboratory fee, \$55. (Spring, odd years)
- 158 Field Botany (4)** Wells
Lecture (2 hours), laboratory and field (4 hours). Field and laboratory studies on vascular plants of the Coastal Plain, Piedmont, and mountains of the mid-Atlantic States. Two weekend field trips required. Laboratory fee, \$55. (Fall, even years)
- 159 Geobotanical Ecology of the Central Appalachians (4)** Tollo, Wells
A multidisciplinary approach to Appalachian ecology involving application of scientific principles from both geology and botany, stressing interrelationships between geological, geochemical, and biological processes. Biweekly field trips. Prerequisite: EES 1 or 5 and BiSc 13-14; or equivalent with permission of instructor. Same as EES 159. (Spring, odd years)
- 167 Marine Biology (4)** Knowlton
Lecture (2 hours), laboratory (4 hours), plus some extended field trips. Study of relationships between organisms and physical, chemical, and biological factors of the marine environment. Consideration of the open ocean and coastal ecosystems and human influences on them. Laboratory fee, \$55. (Spring)
- 168 Tropical Marine Biology (4)** Knowlton and Staff
Study of organism diversity and ecology in tropical marine ecosystems. Lectures and laboratory sessions on campus during the semester, followed by fieldwork on the island of San Salvador, Bahamas, during two weeks in June. Contact Department for information on course structure and additional associated costs. Laboratory fee, \$275. (Spring, even years)
- 169 Applied Marine Ecology (4)** Knowlton and Staff
Study of coastal boreal ecosystems with emphasis on human impacts. Some lectures and laboratory sessions on campus during the semester, followed by fieldwork along the Maine coast during three weeks in June. Contact Department for information on course structure and additional associated costs. Laboratory fee, \$350. (Spring, odd years)
- 171 Undergraduate Research (arr.)** Staff
Admission by permission of the staff member concerned. May be repeated for credit. Prerequisite: Chem 50 or 152; 16 credit hours in biological science courses. Laboratory fee, \$50 per credit hour. (Fall and spring)
- 172 Independent Study in Cell and Molecular Biology (2)** Donaldson, Morris
Prescribed reading list and consultations with staff advisor culminating in a written report and/or examination. Prerequisite: permission of instructor.
- 173 Independent Study in Developmental Biology (2)** Brown, Burns
Prescribed reading list and consultations with staff advisor culminating in a written report and/or examination. Prerequisite: permission of instructor.
- 174 Independent Study in Organismic Biology (2)** Knowlton, Wells
Prescribed reading list and consultations with staff advisor culminating in a written report and/or examination. Prerequisite: permission of instructor.
- 175 Independent Study in Genetic and Evolutionary Biology (2)** Allard, Johnson, Lipscomb
Prescribed reading list and consultations with staff advisor culminating in a written report and/or examination. Prerequisite: permission of instructor.
- 176 Independent Study in Environmental Biology (2)** Merchant, Wells
Prescribed reading list and consultations with staff advisor culminating in a written report and/or examination. Prerequisite: permission of instructor.
- 180 Biotechnology (3)** Morris
Genetic engineering of bacteria, plants, and animals, including humans. Applications of modern biotechnology, especially in the field of medical biotechnology, such as gene therapy, xenotransplantation, and the Human Genome Project. Regulation, prospects, and social impact of biotechnology. Recommended: BiSc 102 or 107. Prerequisite: organic chemistry. (Spring and summer)

182 Diversity and History of Plants (4)

Herendeen

Lecture (3 hours), laboratory (3 hours). A detailed investigation of the diversity, phylogeny, morphology, and fossil history of plants for advanced undergraduates and graduate students. (Fall, even years).

BUSINESS ADMINISTRATION

Requirements for the Bachelor of Business Administration degree are listed under the School of Business and Public Management. The courses listed below form the business core for the B.B.A. degree. Several of these courses are required in the B.Accy. degree as well. BAdm courses are taught by faculty members schoolwide.

1-2 First-Year Development Course (0-0)

Cook

Required of all first-year students in SBPM. This two-semester noncredit course is designed to enhance students' education and begin preparation for business careers. The course meets periodically during the semester. Course fee, \$75 per semester.

51 Introductory Financial Accounting (3)

Lindhal

Basic knowledge of financial accounting concepts and standards as an essential part of the decision-making process for the management of private investment and for business and government organizations. Same as Accy 51. Prerequisite: sophomore standing. (Fall and spring)

52 Introductory Managerial Accounting (3)

Kumar and Staff

Basic knowledge of managerial accounting concepts, procedures, analyses, and internal reports as an essential part of the decision-making process for public and private-sector organizations. Prerequisite: Accy/BAdm 51. (Fall and spring)

53 Management, Organizations, and Society (1.5)

Geranios

Introduction to the manager and the management process in the context of organizations and society. Focus on effective management of the corporation in a changing society. (Fall)

55 Fundamentals of Business Law (1.5)

Kane

Overview of the American legal system with reference to business law and the Universal Commercial Code. Key legal concepts such as contracts and torts. The role of courts: regulation, litigation, and constitution issues. (Fall and spring)

64 Management Information Systems Technology (3)

Aniebonam

An introduction to data and information processing concepts and systems viewed from a contemporary management perspective. Emphasis on uses and applications as well as emerging managerial issues with the potential to reshape the form and function of information systems. Lab required. Prerequisite: basic knowledge of Microsoft Word, Excel, and PowerPoint. (Fall and spring)

66 Organizational Behavior (3)

Bailey

Survey of behavioral science research and practice as related to management. Emphasis on the basic human processes that contribute to the functioning of organizations. Experiential lab required. (Fall and spring)

110 Basic Marketing Management (3)

Achrol, Divita, Maddox, Hassan,

Dyer, Liebrez-Himes, Rau, Smith

Consumer and organizational buying behavior. Strategic marketing processes (market research, segmentation, targeting, positioning, and relationship-building). Product development and brand management, valuation and pricing, channel and logistics management, integrated marketing communications, e-commerce. Prerequisite: Econ 12; Stat 51. (Fall, spring, and summer)

115 Financial Management and Markets (3)

Handorf and Staff

Introduction to financial markets, investment analysis, and financial management. Financial analysis, risk management, working capital management, capital budgeting, financial structure, cost of capital, and dividend policy. Prerequisite: Econ 11-12; Math 31, 32 (or 51, 52); Stat 51 or 53. (Fall and spring)

120 Production Management (3)

Perry, Bagchi

Production planning concepts and analytical tools. Designing and managing production processes: facilities, equipment, process control systems. Design issues, demand forecasting, material planning, acquisition techniques. Managing the factory floor: scheduling, total quality management, continuous improvement concepts and methods. Prerequisite: Stat 51. (Fall and spring)

- 130 Human Resource Management (3)** D. Cohen, Swiercz, McHugh, Goldberg
How human resource management policies and practices affect the achievement of corporate objectives: human resource planning, recruitment, selection, training, development, compensation, and unionism and collective bargaining. Prerequisite: junior standing. (Fall, spring, and summer)
- 135 Diversity, Design, and Development in Global Organization (1.5)** Staff
An exploration of the forces of change that will drive organization adaptations in the 21st century. Consideration of both the underlying phenomena and design implications for the organization life cycle, technology changes, globalization, competition drivers, and increasing service requirements. (Spring)
- 145 International Financial Environment (1.5)** Rehman, Yang
Assessment of international economic and financial developments as they affect international corporate activity. Conceptual issues and current developments in the international financial environment, including an overview of international economic systems, international financial systems, and global financial markets. Prerequisite: Econ 12. (Fall and spring)
- 150 Business and Government Relations (3)** Beales, Burke, Carruth, Griffin
Economic and legal environment of business enterprise: social and political influences; contemporary problems and issues. Restricted to seniors in the B.B.A. and B.Accy. programs. (Fall and spring)
- 190 Special Topics (1 to 3)** Staff
Experimental offering; new course topics and teaching methods.
- 195 Internship (0)**
SBPM undergraduates may register for this course when they wish to have an internship recorded on the transcript. The supervisor must verify that the internship has been completed for a minimum of six hours per week. A \$25 administrative fee is charged. May be repeated each semester if desired.
- 197 Strategy Formulation and Implementation (3)** Davis, Thurman, Cook, Starik, Burke, Teng
An integrative capstone course to develop skills in diagnosing organizational problems, formulating and selecting strategic alternatives, and recognizing problems inherent in strategy implementation. Restricted to seniors in the B.B.A. and B.Accy. programs. (Fall and spring)
- 199 Independent Study (1 to 6)** Staff
Assigned topics with interdisciplinary focus. Admission by prior permission of advisor. May be repeated once for credit.

CHEMISTRY

Professors T.P. Perros, E.A. Caress, D.A. Rowley, D. Ramaker, M. King (Chair), A. Montaser, J.H. Miller, A. Vertes
Assistant Professors M.J. Wagner, C.L. Cahill, M.G. Zysmilich, L.P. Eisen, V. Sadtschenko
Instructor J. Hilderbrandt

Bachelor of Arts or Bachelor of Science with a major in chemistry—The department offers four undergraduate majors, all designed to give students a broad background in the basic divisions of chemistry: analytical, inorganic, organic, and physical. Major I, while providing considerable concentration in chemistry, permits a wider selection of electives. It thus should meet the needs of students preparing to enter medicine, dentistry, law, or related fields. Major II is intended primarily for students preparing for graduate study in chemistry or those planning to enter the chemical profession and wishing to be certified by the American Chemical Society as having met the minimum requirements for professional training. Major III is a program in forensic chemistry and prepares students to meet the needs of federal and state forensic sciences laboratories. Major IV includes additional work in biochemistry and fulfills the American Chemical Society requirement for a certified degree program in chemistry with a biochemistry option.

The following requirements must be fulfilled:

1. Students in Major I, II, III, and IV must meet the general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses for the Bachelor of Arts degree for all majors—Chem 11–12 or Honr 33–34; Chem 22 and 23; required courses in related fields—Math 31 and 32, Phys 21–22. Majors requesting a Bachelor of Science degree must also take two semesters of other approved course work in the natural sciences or mathematics, such as BiSc 13–14 or EES 1 and 5.

3. (a) Required courses for Major I—Chem 111-12, 113, 122, 134, 151-52, 153-54, 161.
- (b) Required courses for Major II—Chem 111-12, 113, 122, 123, 134, 151-52, 153-54, 161, 195 (for 3 credits). Required courses in related fields for Major II—a course in a structured computer programming language, such as Stat 129 or CSci 51.
- (c) Required courses for Major III—Chem 111-12, 113, 122, 134, 151-52, 153-54, 161. Required courses in related fields for Major III—BiSc 13-14; ForS 224, 225, 269, 273, and 280 or their equivalents.
- (d) Required courses for Major IV—Chem 111-12, 113, 122, 123, 134, 151-52, 153-54, 161, 162, 163, 195. Required courses in related fields for Major IV—BiSc 11-12. Strongly recommended courses for Major IV—BiSc 102, 107, and 122.

An entering student who is considering chemistry as a major is strongly encouraged to consult a Chemistry Department advisor regarding the program of study for the first two years. In general, the following sequence of courses is recommended for those students considering Major II: first year—Chem 11-12 or Honr 33-34, Math 31 and 32 (or 30 and 31 if necessary), English composition, electives; second year—Chem 22, 151-52, and 153-54, Phys 21-22, Math 32 if not taken in first year, electives; third year—Chem 23, 111-12, 113, computer programming, electives; fourth year—Chem 122, 123, 134, 161 (if not taken in the junior year), 195, electives. Major I, Major III, and Major IV students should follow this sequence in general and are urged to consult with the chemistry and premedical advisors concerning their academic programs.

Special Honors—In addition to meeting the general requirements stated under University Regulations, a candidate for graduation with Special Honors in chemistry must maintain a cumulative 3.0 grade-point average in chemistry courses and take Chem 195 for at least 3 credits over two semesters. In addition to the final report for Chem 195, a poster or oral presentation is required.

Five-Year Bachelor of Science with a major in chemistry/Master of Science in Forensic Science with a concentration in forensic chemistry—A program leading to the B.S. in the field of chemistry and M.S. in the field of forensic chemistry. The first three years of the program consist of undergraduate course work. Application for admission to the M.S. program in forensic chemistry will be made during the second semester of the third year; for admission to the graduate portion of the program, acceptance must be obtained prior to the start of the fourth year of the program. If acceptance into the M.S. program in forensic chemistry is not desired or not obtained, the requirements for the B.S./B.A. in chemistry (Major I, II, III, or IV) may be fulfilled by the successful completion of appropriate courses during the fourth year of study. If acceptance into the M.S. program in forensic chemistry is obtained, the B.S. in chemistry will be awarded after the successful completion of the fourth year of the program.

The following requirements must be fulfilled.

1. Students must meet the general requirements stated under Columbian College of Arts and Sciences. (See the Graduate Programs Bulletin also.)
2. Course requirements: Chem 11-12, 22 and 23, 111-12, 113, 122, 123, 134, 151-52, 153-54, 161, 195; Phys 21-22; BiSc 13-14; Math 31, 32; Stat 127 and a course in a structured computer programming language; ForS 224, 225, 269, 273, and 280; either ForS or Chem 299-300; and such additional courses in forensic sciences chosen with an advisor to total the equivalent of 30 credit hours of forensic science course work.

Minor in chemistry—Required: Chem 11-12 or Honr 33-34; Chem 22, 23, 110 or 111, 151-52, and 153-54.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Note: Upon consultation with course instructors, specific course prerequisites may be waived. Chem 11-12 and Honr 33-34 are related in their subject matter, and credit for only one of these sets of courses can be earned toward a degree.

PHYSICAL SCIENCE

3-4 Contemporary Science for Nonscience Majors (3-3)

Zysmilich

Contemporary topics in physical, biological, and medical science. Chem 3 is not prerequisite to Chem 4. Laboratory fee, \$50 per semester. (Academic year)

CHEMISTRY

- 11-12 **General Chemistry** (4-4) Hilderbrandt, Rowley, Miller, Cahill, Sadtchenko
Atomic structure and properties; stoichiometry; gas, liquid, and solid state; chemical bonding; solutions; chemical kinetics and equilibria; thermodynamics; acids and bases; electrochemistry; descriptive chemistry. Prerequisite to Chem 11; one year of high school algebra. Prerequisite to Chem 12; Chem 11. Laboratory fee, \$50 per semester. (Chem 11 and 12—fall and spring)
- 22 **Introductory Quantitative Analysis** (3) Vertes
Theory and practice of quantitative analysis by modern methods; evaluation of analytical data emphasizing detection and correction of experimental errors. Correlated with Chem 23. Prerequisite: Chem 12. (Spring)
- 23 **Introductory Quantitative Analysis Laboratory** (1) Vertes, Sadtchenko
Laboratory complement to Chem 22. Prerequisite or concurrent registration: Chem 22. Laboratory fee, \$50. (Fall)
- 105 **Environmental Chemistry** (3) Miller
Chemistry and physics of the environment, with emphasis on water and air pollution; environmental analysis and modeling and their limitations. (Fall)
- 110 **Introduction to Physical Chemistry** (3) Ramaker
Gas, solid, and liquid state, chemical thermodynamics, solutions, chemical equilibrium, kinetics, quantum chemistry, spectroscopy, and macromolecules. Prerequisite: Chem 22; Math 31; Phys 2 or 22; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111-12 or an equivalent course. (Fall)
- 111-12 **Physical Chemistry** (3-3) Ramaker, Wagner, Miller
Gas laws, chemical thermodynamics, chemical equilibrium, kinetics, quantum chemistry, atomic and molecular spectra, structure of solids, liquids, and macromolecules. Prerequisite to Chem 111: Chem 22 and 23; Math 31; Phys 22; or permission of instructor. Prerequisite to Chem 112: Chem 111. (Academic year)
- 113 **Physical Chemistry Laboratory** (2) Miller, Ramaker, Wagner, and Staff
Laboratory complement to Chem 111. Prerequisite or concurrent registration: Chem 111. Laboratory fee, \$50. (Spring)
- 122 **Instrumental Analytical Chemistry** (3) Montaser, Vertes
Theory of instrumental methods in qualitative and quantitative analysis, determination of structure, with emphasis on atomic and molecular spectrophotometry, infrared spectroscopy, nuclear magnetic resonance, mass spectrometry, chromatography, and electroanalysis. Correlated with Chem 123. Prerequisite or concurrent registration: Chem 111 or permission of instructor. (Fall)
- 123 **Instrumental Analytical Chemistry Laboratory** (2) Wagner, Vertes, Sadtchenko
Laboratory complement to Chem 122. Prerequisite or concurrent registration: Chem 111 and 122. Laboratory fee, \$50. (Fall)
- 134 **Descriptive Inorganic Chemistry** (3) Cahill
Intermediate-level course emphasizing the descriptive chemistry of the elements. Prerequisite: Chem 22, 23, and 152. (Spring)
- 141 **Experimental Chemistry** (3) Staff
Experimental methods common to all disciplines of chemistry. Use of the chemical literature; operation of chromatographic and spectroscopic instrumentation; interpretation of spectra by correlation methods. Prerequisite: Chem 152 and 154. Laboratory fee, \$50. (Fall and spring)
- 151-52 **Organic Chemistry** (3-3) King, Caress, and Staff
Systematic treatment of the structure, preparation, properties, and reactions of the principal classes of organic compounds. Fundamental principles of stereochemistry, reaction mechanisms, and spectroscopic methods of analysis. Credit may not be earned for both Chem 50 and Chem 151-52. Prerequisite to Chem 151: Chem 12. Prerequisite to Chem 152: Chem 151. (Academic year)
- 153-54 **Organic Chemistry Laboratory** (1-1) King and Staff
Laboratory complement of Chem 151-52. Introduction to and practice in basic skills of synthesis, separation, purification, and identification of organic compounds. Prerequisite or concurrent registration: Chem 151-52. Prerequisite to Chem 154: Chem 153. Laboratory fee, \$50 per semester. (Academic year)

- 161 **Biochemistry (4)** Vanderhoek
Prerequisite: Chem 151-52. Same as Bioc 101 and BiSc 103. (Fall)
- 162 **Special Topics in Biochemistry (2)** Vanderhoek, Donaldson, and Staff
Prerequisite: Chem 161. Same as Bioc 102 and BiSc 106. (Spring)
- 163 **Biochemistry Laboratory (2)** Vanderhoek
Prerequisite: Chem 161. Laboratory fee, \$75. Same as Bioc 103 and BiSc 104. (Spring)
- 191 **History of Chemistry (2 or 3)** Staff
Historical development of chemistry from antiquity to the 20th century. Prerequisite: Chem 12. (Fall)
- 193 **Chemical Instrumentation (3)** Montaser
Electronic analog measurements and control of electrical quantities in chemical instrumentation; digital and analog data conversion and optimization of electronic measurements in chemical instrumentation; computer interfacing and programming using PC-based systems. Prerequisite: Chem 112 and 122. Laboratory fee, \$30. (Fall)
- 195 **Undergraduate Research (1 or 2)** Staff
Research on problems approved by the staff. Approval must be obtained prior to registration. A final written report on the work is required. For students requesting Special Honors in chemistry, a poster or oral presentation is also required. May be repeated once for credit. Majors are encouraged to take the course for two semesters. Laboratory fee, \$50. (Fall and spring)

CHINESE

See East Asian Languages and Literatures.

CIVIL AND ENVIRONMENTAL ENGINEERING

Professors K. Mahmood, I.H. Shames, K.H. Digges (*Research*), M.I. Haque, W. Roper (*Chair*)
Associate Professors N.E. Bedewi, A. Eskandarian, V. Motevalli (*Research*), R. Riffat, M.T. Manzari
Assistant Professors C.D. Kan (*Research*), S.S. Badie
Adjunct Professors B. Whang, M.O. Critchfield, M. Yachnis
Professorial Lecturers G.C. Everstine, A. Kehnemui, C. Smith, C. Nash
Associate Professorial Lecturers K. Khozeimeh, G.W. Sherk

See the School of Engineering and Applied Science for the programs of study leading to the Bachelor of Science (Civil Engineering).

- 1 **Introduction to Civil and Environmental Engineering (1)** Staff
An introduction to the profession of civil and environmental engineering. Field visits and laboratory exercises complement classroom instruction. (Fall)
- 117 **Engineering Computations (3)** Mahmood, Kaufman
Numerical methods for engineering applications. Methods for solving systems of linear equations, root finding, curve fitting, and data approximation. Numerical differentiation and integration and numerical solution of differential equations. Computer applications. Prerequisite: CSci 50. (Fall)
- 120 **Introduction to the Mechanics of Solids (3)** Haque, Shames
Stress and strain, axial load problems, torsion, shear force and bending moment, pure bending of beams, shearing stresses in beams, compound stresses, analysis of plane stress and plane strain, combined stresses, deflection of beams, statically indeterminate problems, columns, energy methods. Prerequisite: ApSc 57, 113. (Fall and spring)
- 121 **Structural Theory I (3)** Manzari
Theory of statically determinate structures; stability and determinacy; influence lines and moving loads. Analysis of roof systems and cable structures. Calculation of deflections. Approximate methods of analysis of indeterminate structures. Prerequisite or concurrent registration: CE 120. (Fall)
- 122 **Structural Theory II (3)** Manzari
Theory of statically indeterminate structures using matrix methods and classical approaches such as moment distribution and slope-deflection; influence lines; energy methods. Prerequisite: CE 121. (Spring)
- 166 **Materials Engineering (2)** Gilmore, Haque
Mechanical properties, plastic deformation dislocation theory, yielding, strengthening mechanisms, microstructure and properties, heat treatment

- of steel, composites, amorphous materials, viscoelastic deformation, creep, fracture, fatigue, fatigue crack propagation. Prerequisite: ApSc 130; concurrent registration: CE 120. Same as MAE 166. (Fall)
- 167 Mechanics of Materials Laboratory (1)** Gilmore, Haque
Measurement of strains and study of failure resulting from applied forces in ductile, brittle, anisotropic, elastomeric, plastic, and composite materials. Study of tension, compression, bending, impact, and shear failures. Prerequisite or concurrent registration: CE 166. Same as MAE 167. (Fall)
- 168 Introduction to Geotechnical Engineering (3)** Manzari and Staff
Soils and rock formation, soil composition, permeability, seepage and flow net analysis, stresses in soil medium, consolidation and settlement, shear strength of soil, analysis of lateral earth pressures, soil compaction. Prerequisite: CE 120, MAE 126. (Fall)
- 185 Geotechnical Engineering Laboratory (1)** Manzari and Staff
Laboratory experiments to evaluate liquid and plastic limits, grain-size distribution, shear strength, compressibility, permeability, and moisture-density relationship of soils. Prerequisite or concurrent registration: CE 168. (Fall)
- 188 Hydraulics Laboratory (1)** Mahmood and Staff
Laboratory experiments and demonstrations for stability of floating bodies, Bernoulli's theorem, velocity, and pressure measurements in pipe and flume. (Spring)
- 189 Environmental Engineering Laboratory (1)** Riffat and Staff
Laboratory experiments for physical and chemical analyses of water and wastewater. Measurement of turbidity, alkalinity, dissolved oxygen, BOD, COD, suspended solids, and optimum coagulant dose using jar tests. Prerequisite or concurrent registration: CE 194. (Fall)
- 190 Contracts and Specifications (2)** Manzari and Staff
Law of contracts, construction contracts, specifications, bidding, insurance and bonds, professional liability, arbitration of disputes, litigation. (Spring)
- 191 Metal Structures (3)** Haque
Principles of the design of metal structures, structural elements, connections, specific problems of analysis, methods of construction, professionalism in design. A design project, including the use of computer software and a detailed report, is required. Prerequisite or concurrent registration: CE 122. (Fall)
- 192 Reinforced Concrete Structures (3)** Manzari
Properties of concrete and reinforcement; design of shear reinforcement; development of reinforcement; design of columns, floor slabs and building frames; ethics and professionalism in design. A design project, including the use of computer software and a detailed report, is required. Prerequisite or concurrent registration: CE 122. (Spring)
- 193 Hydraulics (3)** Mahmood and Staff
Fluid statics: pressure forces, buoyancy, and flotation. Application of kinematic principles; flow fields, stream tubes, and flow nets. Fluid dynamics: applications to pipe flow, hydraulic models, measurement of pressure, and velocity. Open channel flow: applications to water resources engineering. Prerequisite: MAE 126. (Spring)
- 194 Environmental Engineering I: Water Resources and Water Quality (3)** Riffat and Staff
Physical and chemical analyses of water quality and characteristics. Microbiology of water and pathogens. Introduction to water treatment processes involving coagulation, flocculation, filtration, and disinfection. Prerequisite or concurrent registration: CE 193. (Spring)
- 195 Hydrology and Hydraulic Design (3)** Haque and Staff
Descriptive hydrology: hydrologic cycle, precipitation, stream flow, evaporation, and transpiration. Quantitative hydrology: hydrograph analysis, hydrographs of basin outflow, storage routing. Probability concepts in hydrology: flood frequency, rainfall frequency, stochastic hydrology. Culverts and stilling basins. Prerequisite or concurrent registration: ApSc 115, CE 193. (Fall)
- 196 Design and Cost Analysis of Civil Engineering Structures (3)** Manzari and Staff
Total structural systems concepts. Design of civil engineering structures such as piers, wharves, bulkheads, offshore platforms, dams, and other special struc-

tures. Principles of cost analysis for timber, steel, and reinforced concrete structures. Project and report are required. Prerequisite: senior status. (Spring)

197 Environmental Engineering II: Riffat and Staff

Water Supply and Pollution Control (3)

Introduction to wastewater treatment systems including clarification, suspended and attached growth processes. Use of dissolved oxygen models. Water supply and wastewater collection systems, applied hydraulics of pipelines and pumps. Planning to meet quality needs and regulatory requirements. Prerequisite: CE 194. (Fall)

198 Research (1 to 3)

Staff

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

CLASSICAL AND SEMITIC LANGUAGES AND LITERATURES

Professors J.E. Ziolkowski, E.A. Fisher (*Chair*)

Assistant Professors M.D. Ticktin, Y.M. Moses, E.H. Cline

Lecturers H. Javadi, S.S. Montasser, M.A. Sharaf, C.G. Brown

Bachelor of Arts with a major in classical humanities—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Latn or Grek 1–2, 3–4, or equivalent, and Clas 71, 72. (Hmn 1 or Honr 15 may be taken in place of either Clas 71 or 72.)
3. Required courses in the major—(a) 12 credit hours selected from 100-level Latin, Greek, or approved classical studies courses; (b) 18 credit hours selected from AH 101, 102, 111, 112, 155; Hist 105, 107, 108, 109, 110, 111, 209; Ling 101; Phil 111; PSc 105; Rel 143.

Special Honors—In addition to the general requirements stated under University Regulations, in order to be considered for graduation with Special Honors, a student must (1) have attained a 3.7 grade-point average in the major and at least a 3.25 average overall by the end of the junior year, and (2) no later than the beginning of the senior year consult a departmental faculty member about a research project to be prepared under the supervision of that faculty member. Only if a committee of two faculty members approves the completed project will Special Honors be recommended; the research project must be graded A or A–.

Minor in classical humanities—(a) 6 credit hours selected from Latn or Grek 1–2; (b) 9 credit hours selected from Latn or Grek 3–4, 103, 104; Clas 71, 72, 105, 107, 108, 113, 115, 117, 118, 119, 120, 127, 170, 185, 186; (c) 6 credit hours selected from AH 101, 102, 111; Hist 105, 107, 108, 109, 110.

ARABIC

1–2 First-Year Arabic (4–4)

Staff

Fundamentals of speaking, understanding, reading, and writing of Modern Standard Arabic. Laboratory fee, \$50 per semester. (Academic year)

3–4 Second-Year Arabic (4–4)

Staff

Continuation of Arab 1–2. Further development of speaking, understanding, reading, and writing skills of Modern Standard Arabic. Prerequisite: Arab 1–2 or equivalent. Laboratory fee, \$50 per semester. (Academic year)

9–10 Third-Year Arabic (3–3)

Staff

Continuation of Arab 3–4. Further development of speaking, understanding, reading and writing skills of Modern Standard Arabic. Prerequisite: Arab 3–4 or equivalent. Laboratory fee, \$50 per semester. (Academic year)

103 Modern Arabic Literature—Nonfiction (3)

Staff

Practice and continued development of language skills, utilizing articles from current newspapers, magazines, journals, plus SCOLA broadcasts and video presentations. Prerequisite: Arab 3–4 or permission of instructor. Laboratory fee, \$50. (Fall)

104 Modern Arabic Literature—Fiction (3)

Staff

Study of selected fiction in Modern Standard Arabic. Practice and continued development of language skills; short essay writing. Prerequisite: Arab 103 or equivalent and permission of instructor. Laboratory fee, \$50. (Spring)

GREEK

- 1-2 Beginning Greek: Classical (4-4)** Staff
Study of the grammar, vocabulary, and structure of ancient Greek. Reading of selected ancient authors. Prerequisite: permission of instructor. (Alternate academic years)
- 3-4 Intermediate Greek: Classical (3-3)** Staff
Reading of ancient Greek prose or poetic works (e.g., selections from Homer, Plato, Euripides). Review of grammar. Prerequisite: Grek 1-2 or equivalent. (Alternate academic years)
- 103-4 Major Greek Authors (3-3)** Staff
Selections from a wide variety of Greek prose, drama, and poetry, suited to the needs of the class. May be repeated for credit with permission of instructor. Prerequisite: Grek 4 or equivalent.

HEBREW

- 1-2 Beginning Hebrew (4-4)** Moses
An active presentation of Hebrew as it is spoken and written today. Comprehension, speaking, reading, and writing skills are stressed. Laboratory fee, \$50 per semester. (Academic year)
- 3-4 Intermediate Hebrew (4-4)** Staff
Further development of skills in speaking, reading, writing, and comprehension of modern Hebrew. Texts range from Israeli newspaper items to selections from classical materials. Prerequisite: Hebr 1-2 or equivalent. Laboratory fee, \$50 per semester. (Academic year)
- 103 Modern Hebrew Nonfiction (3)** Moses
Directed readings in humanities and social sciences. Development of linguistic skills necessary for independent research. May be repeated for credit. Prerequisite: Hebr 4 or permission of instructor. (Fall)
- 104 Modern Hebrew Fiction (3)** Staff
Study of selected modern Israeli short stories and poems. Prerequisite: Hebr 103 or permission of instructor. (Spring)
- 106 The Israeli Media (3)** Moses
Explores the Israeli press, television and radio news broadcasts in Hebrew; focuses on developing increasing proficiency in reading and aural comprehension through class discussions and written assignments in Hebrew. Prerequisite: Hebr 103 or permission of instructor. (Spring)
- 120-21 Advanced Hebrew Literature (3-3)** Staff
Selections from Hebrew literature throughout the ages: Bible, Rabbis, medieval Hebrew literature; classical motifs in modern Israeli literature. Literary analysis (writing and discussion) in Hebrew. Prerequisite: Hebr 104 or permission of instructor. (Academic year)

LATIN

- 1-2 Beginning Latin (3-3)** Staff
Grammatical essentials of Latin, appropriate reading selections, development of English derivatives, introduction to Roman life and literature. (Academic year)
- 3 Intermediate Latin: Prose and Poetry (3)** Staff
Development of ability to read and understand Latin literature of moderate difficulty. Prerequisite: Latn 1-2 or equivalent. (Fall)
- 4 Vergil's Aeneid (3)** Staff
Significant passages of Vergil's famous epic in Latin; reading and discussion of the entire poem in translation. Prerequisite: Latn 3 or permission of instructor. (Spring)
- 103-4 Major Latin Authors (3-3)** Staff
Selections from one or two major authors will be read each semester. May be repeated for credit. Prerequisite: Latn 3, 4; or permission of instructor. (Academic year)

YIDDISH

- 1-2 **Yiddish for Reading and Conversation (3-3)** Ticktin
Grammatical essentials of the language, appropriate reading selections, conversational exercises for beginners. (Alternate academic years)

CLASSICAL STUDIES (in English)

- 63 **Medical Terms from Greek and Latin (3)** Staff
Mastery of medical terminology by learning word elements from Greek and Latin and the principles that govern both the formation of medical words and the derivation of their meanings.
- 71 **Greek Literature and Civilization (3)** Staff
Study of ancient Greek civilization with focus on public and private life as seen primarily through literature. (Fall)
- 72 **Roman Literature and Civilization (3)** Staff
Study of Roman civilization with focus on public and private life as seen primarily through literature. (Spring)
- 73 **Classical Islamic Literature (3)** Javadi
A survey of pre-modern Islamic literature, including translations of poetry, prose, popular literature, and selections from the Quran. Topics such as mysticism, court literature, travel literature, urban mercantile literature, etc., are explored from the Arabic tradition as well as from the Persian and Turkish/Ottoman traditions. (Fall, alternate years)
- 82 **Modern Middle Eastern Literature (3)** Javadi
20th-century literature of the Middle East (prose, poetry, short stories, novels), beginning with its 19th-century modernization and emphasizing various themes (e.g., alienation, exile, etc.). (Fall, alternate years)
- 100 **Modern Hebrew Literary Classics (3)** Staff
Prose and poetry of a century of writing from the beginning of the Hebrew literary renaissance to contemporary Israeli literature, including works of Bialik, Agnon, Hazaz, Amichai, Oz, and Yehoshua. Discussions stress historical development and authors' treatments of tradition and modernity.
- 101 **Israeli Society and Culture: Literary Perspectives (3)** Staff
A study of literature reflecting such contemporary issues as the conflict between the "builders' generation" and their children; the cultural contacts of Ashkenazim and Sefardim; image of the Arab; impact of the Holocaust; Zionist ideals and current realities. (Fall)
- 105 **Special Topics (3)** Staff
Topics in Arabic, Greek, Hebrew, Roman, and Yiddish literature; topics announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 107 **Greek and Roman Mythology (3)** Staff
The creation of the world, the nature of the gods, and the adventures of heroes as described in various Greek and Roman literary sources (e.g., epic, drama, hymns) and as shown in ancient art. (Fall)
- 108 **Approaches to Classical Mythology (3)** Staff
Selected myths examined through various disciplinary approaches, such as archaeology, psychology, history, comparative literature, and women's studies. Prerequisite: Clas 107 or equivalent. (Spring)
- 113 **Greek and Roman Drama (3)** Staff
Study of Greek and Roman tragedy and comedy; the nature and setting of dramatic performance in classical antiquity.
- 115 **European Civilization to 800 A.D. (3)** Cline
Same as Hist 105.
- 117 **The Ancient Near East and Egypt to 322 B.C. (3)** Cline
Same as Hist 107.
- 118 **History of Ancient Israel (3)** Cline
Same as Hist 108.
- 119 **Early Aegean and Greek Civilizations to 338 B.C. (3)** Cline
Same as Hist 109.
- 120 **The Roman World to 337 A.D. (3)** Cline
Same as Hist 110.

- 127 Classical Influence on Western Civilization (3)** Ziolkowski
A survey of Greek and Roman influence on Western civilization, especially in architecture, language, literature, and science. Prerequisite: a course in classical literature or history.
- 170 Issues of Gender in Classical Antiquity (3)** Staff
In-depth study and discussion of readings from ancient and modern sources on women and gender difference in Greek and Roman society.
- 185-86 Directed Project (1, 2, or 3)** Staff
Individual advanced reading or research, to be arranged with a member of the faculty. May be repeated for credit. Admission by permission of instructor and department.

CLINICAL LABORATORY SCIENCE

The Bachelor of Science in Health Sciences in the field of clinical laboratory science is described briefly under the School of Medicine and Health Sciences in this Bulletin. Complete information is available from the School of Medicine and Health Sciences.

COLUMBIAN COLLEGE ADVISING WORKSHOP

The Columbian College Advising Workshop is open only to Columbian College freshmen. In addition to a faculty member who serves as the workshop leader, each workshop has a team that includes a member of the University's professional or administrative staff and a student peer advisor.

- 1 Freshman Advising Workshop (0)** Moreland and Staff
Participatory and informational sessions required for entering freshmen, designed to integrate students into Columbian College and the University by providing an introduction to the liberal arts and sciences, promoting effective participation in a richly diverse academic community, and encouraging an enlightened self-sufficiency in the selection of courses and majors. Graded on a P/NP basis only.

COMMUNICATION

Professor C. Warren (Director)

Assistant Professors J.C. Miller, G. Selby, E.L. MacGeorge

Assistant Professorial Lecturers P. Frecknall, P. McKenzie, R. McKelvy, T. Edgar, Q. Ahmed, A. Bresnahan, K. Cherry, S. Parker, S. Burgoyne

Students are accepted as communication majors through a selective application process that commences only after the student is admitted to the University. Students are encouraged to apply during the first semester, or early in the second semester, of their sophomore year. Applications are not accepted from students with more than 75 credit hours. A student may apply no more than twice to the major. Minimum requirements for admission include a GPA of 3.0 and completion of, or current enrollment in, one of three courses: Comm 25, 40, or 41. Achievement of the minimum GPA does not guarantee admission to the major, because the acceptance process is selective. Application forms and the Student Handbook for Communication Majors, which provides additional information about the major, including the application process, are available in the program office.

Bachelor of Arts with a major in communication—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Required courses in the major: Comm 25, 40, 41, 100, 110, 150, 199; 18 additional hours of 100-level courses in communication, as approved by the major advisor.
3. Required courses in related areas: 15 credit hours of 100-level courses in one other department, program, or field of study, as approved by the major advisor.

Special Honors—Seniors majoring in communication may apply for Special Honors if they meet the following criteria: (1) the Special Honors requirements stated under University Regulations; (2) the requirements for selection to Lambda Pi Eta, the National Communication Association Honor Society, which maintains a chapter in the GW Communication Program (i.e., open to majors who have completed a minimum of 24 hours in

communication course work, who hold a grade-point average of 3.3 in communication courses and a grade-point average of 3.0 overall, and who are recommended by a majority of the full-time communication faculty); and (3) a grade of A received on the thesis required in Comm 199, Senior Seminar.

Minor in communication—18 credit hours of communication courses, including Comm 25, 40 or 41, 120, and 150.

- 25 **Introduction to Communication Studies** (3) Miller
Introduction to historical and intellectual development of the field. Students survey the origins of contemporary theory; learn about fundamental concepts, models, investigative tools, and contexts of communication; and explore a variety of professional opportunities awaiting communication graduates.
- 40 **Public Communication** (3) McKelvy, Miller, Ahmed, McKenzie
Study and practice of the basic techniques of public speaking used to inform, to entertain, and to persuade audiences. Emphasis on the speech-building process: audience analysis, research, development, composition, organization, style, delivery, and criticism.
- 41 **Interpersonal Communication** (3) Burgoyne, MacGeorge, McKenzie, Parker
Study and practice of the role of verbal and nonverbal communication in ritual, information and perspective sharing, problem solving, and relationship formation, maintenance, and dissolution. Designed to raise awareness of the complexity and power of the communication process in daily life and to help students develop their interpersonal skills cognitively, affectively, and behaviorally.
- 42 **Business and Professional Speaking** (3) Ahmed
Study of the communication process in business and professional organizations; practice in interviewing, small group communication, and public presentations. For non-majors and non-minors only.
- 100 **Communication Theory** (3) MacGeorge
Inquiry into the nature and function of communication theory as a framework for the study of communicative behavior. Emphasis is placed on analysis of paradigmatic approaches in rhetorical, interpersonal, and mass communication theories and models, and on examination of contemporary research literature in communication. Prerequisite: Comm 25.
- 110 **Research Methods** (3) Selby
Processes of inquiry within interpersonal and public communication. Students are introduced to concepts of framing research questions, conducting literature reviews, developing a research design, using qualitative and quantitative research tools, and interpreting results of research in communication. Prerequisite: Comm 100.
- 120 **Small Group Communication** (3) Warren, Selby
The study and practice of communication in small groups, focusing on problem solving, norms, roles, and leadership. Prerequisite: Comm 41 or permission of the instructor.
- 140 **Nonverbal Behavior** (3) Burgoyne
Introduction to predominant theories, principles, and problems in the study of nonverbal behavior; application of research results to everyday life. Topics include facial expression, eye behavior, physical appearance, body movement and gestures, tactile messages, vocal characteristics, use of time, spatial dynamics, gender and life-stage differences.
- 150 **Persuasion** (3) Warren
In-depth study of the principles and techniques of persuasion from both production and consumption perspectives, in both personal and mediated contexts. Emphasis on the common-premise model, with consideration of such topic areas as pathos/ethos/logos, attitude and behavior change, effectiveness, ethics, and subconscious influence. Prerequisite: Comm 25.
- 170 **Organizational Communication** (3) Cherry
Exploration of the philosophy, process, problems, and potential of human communication within organizational contexts. May involve experiential workshops and fieldwork. Prerequisite: Comm 41 or 120 or permission of instructor.
- 172 **Health Communication** (3) Edgar
Exploration of the nature, functions, and impact of relational communication in the context of health care. Both formal (health care organizations) and in-

formal (family communication) systems may be studied. Topics can include provider-patient interaction, media and health, confirmatory communication. Prerequisite: Comm 41 or 100 or permission of instructor.

- 174 **Intercultural Communication (3)** Miller
Exploration of the process, trends, rewards, and difficulties of human communication in intercultural contexts, with an eye toward establishing guidelines for mitigating miscommunication across cultures. May involve fieldwork. Prerequisite: Comm 41 or permission of instructor.
- 176 **Issues and Image Management (3)** Bresnahan
Theoretical and practical exploration of the issues and image management function in corporate, professional, and nonprofit organizations. Assignments may include in-class collaboration on case studies of communication campaigns and crisis communication strategies, interviews with professionals in the practice of communication management, and a communication audit of strategies and messages of a selected organization.
- 180 **Communication Criticism (3)** Warren, Selby
Evaluation of communication paradigms along critical dimensions of analysis. Prerequisite: Comm 40 or 150 or permission of instructor.
- 190 **Selected Topics (3)** Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 196 **Independent Study (1 to 3)** Staff
Independent research and special projects. Open to seniors or exceptionally well-prepared juniors majoring in communication. Before students are permitted to register, they must submit a written proposal of the plan of study and obtain approval of the faculty member who will direct the study and of the program chair.
- 197 **Internship (3)** Warren
For communication majors and minors. Student-secured internships in communication-related organizations. Students spend at least 15 hours per week doing communication-related work in a public or private organization. Meetings, reports, and/or analysis paper may be required by supervising instructor. Admission requires prior program approval. Graded on a Pass/No Pass basis.
- 199 **Senior Seminar (3)** Warren, Selby, MacGeorge
Capstone course limited to communication majors. Selected reading and discussion. Each student works on an individually designed research project throughout the term, the results of which will be presented in a major paper. Prerequisite: Comm 100 and 110.

COMPUTER SCIENCE

Professors A.C. Meltzer, W.D. Maurer, L.J. Hoffman, S.Y. Berkovich, M.B. Feldman, P.S. Bock, J.L. Sibert, R.S. Heller, C.D. Martin, H.-A. Choi, A. Youssef, B. Narahari (Chair), S. Muftic

Associate Professors S. Rotenstreich, J.K. Hahn, R. Simha, D. Grier

Assistant Professors A. Bellaachia, R.W. Lindeman

Adjunct Professors G.J. Kowalski, D.C. Roberts

Professorial Lecturers J.H. Scharen-Guivel, S.H. Kaisler

Associate Professorial Lecturer T. Hanson

Assistant Professorial Lecturers R.A. Fernandez, R. Vittucci, T. Bragg

See the School of Engineering and Applied Science for programs of study leading to the Bachelor of Arts and Bachelor of Science (Computer Science).

Note: CSci 10, 30, 33, 35, and 39 may not normally be counted toward degree requirements for computer science majors.

- 10 **Applications Software (3)** Heller and Staff
Introduction to the use of microcomputer hardware and software for word processing (e.g., Word), spreadsheets (e.g., Excel), and database management (e.g., Access), with emphasis on the use of computers to solve typical problems in academia and business. (Fall and spring)
- 30 **Introduction to Computers and the Internet (3)** Martin and Staff
Survey of computers and languages. Introduction to computer programming. History of computing and networking. The effects of computing and the Internet

on our lives. E-commerce and new technologies. Concepts of web page design. (Fall and spring)

- 33 **Introduction to Internet Technology (3)** Meltzer and Staff
An introductory course for non-technical students who wish to obtain a better understanding of the hardware and software that comprise the Internet. Information transfer over fiber, routing and switching of packets, methods of information transfer, protocols, software, ISP, web pages and multimedia. (Fall and spring)
- 35 **Introduction to Web Software Development (3)** Martin and Staff
Introduction to the Internet. Topics include address and URL to find your way, linking to a URL, HTML and web programming, building a web page, building a home page, client-server techniques. (Fall and spring)
- 39 **Spreadsheet Models for Liberal Arts (3)** Maurer and Staff
Using a spreadsheet program for a wide variety of academic purposes. Geographical and cultural statistics, international currencies and languages, sports statistics, formulas, grade sheets, budgets, sales summaries, what-if analysis, financial functions, collaborative work, maps, and line, bar, and pie charts. Uses for all the features of a typical spreadsheet program. Prerequisite or corequisite: Stat 51 or 53 or 91. (Spring)
- 41 **Introduction to Computer Science (3)** Feldman and Staff
A survey of the disciplines of computer science including history of computing, assembly and high-level programming languages, machine logic and circuits, the Turing machine, artificial intelligence, UNIX operating system, Internet basics, and web page design. (Fall and spring)
- 49 **Introduction to C Programming (3)** Choi and Staff
Structured programming with the C language. Control structures. Data types. Use of pointers. Matrix manipulation to solve simultaneous equations. External subroutines for mathematical and graphical applications. Introduction to C++. Complex number representation. Corequisite: Math 20 or 31. (Fall and spring)
- 50 **Introduction to FORTRAN Programming (3)** Bock and Staff
Structured programming with high-level language using FORTRAN. Control structures. Different data types with emphasis on real and complex number computations. Arrays used with vector and matrix manipulation to solve simultaneous equations. External subroutines for mathematical and graphical applications. Prerequisite or corequisite: Math 20 or 31. (Spring)
- 51 **Introduction to Software Development (3)** Feldman and Staff
Introduction to the solution of problems on a digital computer using Ada. Structured programming concepts; peer review and proper documentation techniques; efficiency of programs; design of test data. Writing, debugging, and running programs in an interactive computing environment. Prerequisite or corequisite: CSci 41. (Fall and spring)
- 52 **Introduction to Computer Organization (3)** Narahari and Staff
Basic principles underlying architecture and organization of computer systems. Computer representation of numbers, hardware components and organization, instruction sets, microcode, CPU, memory and I/O organization. Assembly language, memory management, introductory operating system and network concepts. Prerequisite: CSci 131. (Fall)
- 100 **Introduction to Programming with C++ (3)** Martin and Staff
Intensive introductory course for students with a science, mathematics, or other quantitative background. Solution of numerical and nonnumerical problems on a digital computer using C++ programming language in a Unix environment. Recommended for graduate and advanced undergraduate students in other departments. Prerequisite: Math 32 or equivalent. (Fall and spring)
- 102 **Introduction to Programming with Java (3)** Narahari and Staff
An introductory course in programming a computer, using the Java language. Object-oriented programming, classes, applets, methods, control structures, inheritance, overriding, widgets and the AWT package, containers, and exceptions. (Fall and spring)
- 103 **Data Structures and C++ (3)** Maurer and Staff
Big-O notation, linked lists, stacks, queues, trees, graphs, searching, sorting, resizable arrays. Classes in C++, templates, constructors, destructors, exceptions, files, derived classes, operator overloading. May be taken for graduate

- credit by students in fields other than computer science. Prerequisite: CSci 49 or 100. (Fall and spring)
- 110 Technology and Society (3)** Martin and Staff
 Historical, social, and ethical issues of the technological age. Ethical principles; social analysis skills needed to evaluate the design and implementation of complex computer systems. Privacy, computer crime, equity of access, automation, and professional ethics. Data collection, analysis, and presentation, technical writing, and oral communication skills. Prerequisite: CSci 49 or 50 or 51. (Spring)
- 123 Discrete Structures (3)** Narahari and Staff
 Mathematics for computer science. Sets, functions, and sequences. Propositional and predicate calculus, formal proofs, mathematical induction. Matrices, semigroups, groups, and isomorphism. Relations, partitions, equivalence relations, trees, graphs. May be taken for graduate credit by students in fields other than computer science. Prerequisite: CSci 41 or 49; Math 20 or 31. (Fall and spring)
- 131 Algorithms and Data Structures I (3)** Feldman and Staff
 Data structures used in computer programming and algorithms. Use of tree structures, arrays, lists, stacks, files, strings, and linked structures. Sorting, searching, hashing, and merging of data. Performance of algorithms using different data structures. May be taken for graduate credit by students in fields other than computer science. Prerequisite: CSci 51. (Fall and spring)
- 135 Computer Architecture I (3)** Meltzer and Staff
 Machine and assembly language programming; instructions, directives, flow of control, machine architecture, procedure calls, methods of addressing. Study of various machine architectures, arithmetic operations, and computer codes. Prerequisite: CSci 51, 123. (Fall)
- 136 Computer Architecture II (3)** Meltzer and Staff
 Logic design, combinational and sequential circuits, K-maps, programmable logic, flipflops, and registers. Design of memory, arithmetic and control units. Design of the data path and microprogrammed control. Pipelined machines, memory hierarchy, and peripheral units. Prerequisite: CSci 135. (Spring)
- 141 Software Engineering I (3)** Feldman and Staff
 Object-oriented thinking, software composition and classification, component coupling and cohesion, inheritance and polymorphism, design patterns. World Wide Web applications and applets. Prerequisite: CSci 131. (Fall and spring)
- 150 Foundations of Computing (3)** Choi and Staff
 Ordering, formal grammars, finite-state machines, equivalence of machines, reduction, finite-state languages, acceptors, regular expressions, pushdown automata, context-free languages, Turing machines, computability. Prerequisite: CSci 131, 135. (Fall)
- 151 Algorithms and Data Structures II (3)** Narahari and Staff
 Advanced data structures (internal and external): hash tables, AVL trees, B-trees. Advanced algorithms: graph searches, shortest path, greedy method, divide and conquer, dynamic programming, backtracking. Introduction to NP-completeness. Prerequisite: CSci 123, 141. (Fall)
- 156 Introduction to Operating Systems (3)** Rotenstreich and Staff
 Process management, process state, concurrent processing, synchronization, events. Operating system structure, the kernel approach, processor scheduling, task switching, monitors. System management, memory management, process loading, communication with peripherals. File systems. Interactive computation. Prerequisite: CSci 103 or 141. (Fall)
- 160 Theory of Computer Translators (3)** Choi and Staff
 Lexical and syntax analysis, regular expressions, context-free grammars, parsing techniques, top-down parsing, efficient parsing, syntax-directed translation, intermediate formats, flow of control, block structures, procedure calls, symbol tables, run-time storage, error-detection and recovery, code optimization, code generation. Prerequisite: CSci 136, 150. (Spring)
- 161 Software Engineering II (3)** Rotenstreich and Staff
 Requirements definition, modularity, structured design, data and functional specifications, verification, documentation. Program design. Software tools,

- maintenance, project organization, design teams, quality assurance. Prerequisite or corequisite: CSci 151. (Spring)
- 169 **Software Paradigms (3)** Feldman and Staff
Comparison of the major paradigms of software design and their embodiment in programming languages. Object-oriented, procedural, scripting, functional, and concurrent software design paradigms and patterns. Prerequisite: CSci 141. (Spring)
- 171 **Concepts and Applications of Computer Graphics (3)** Hahn and Staff
2-D graphics principles. Principles of digital painting, drawing, and photo-editing. Image manipulation and storage, electronic color representation, and printing. Building 3-D geometry and rendering; 3-D input and output devices and techniques. Prerequisite: CSci 141. (Fall)
- 173 **Introduction to Numerical Methods (3)** Youssef and Staff
Numerical methods for solving simultaneous linear equations, roots of equations, eigenvalues and eigenvectors, numerical differentiation and integration, interpolation, solution of ordinary and partial differential equations, and curve fitting. May be taken for graduate credit. Prerequisite: ApSc 113, 115; CSci 131 or equivalent. (Fall)
- 174 **Introduction to Artificial Intelligence (3)** Bock and Staff
Abstraction of process and data with list structures. Functional programming. Changes in the state of objects and processes. Environments. Streams. Messages. LISP and PROLOG interpreter models using EVAL and APPLY. Symbolic logic and formal inference; unification and resolution. May be taken for graduate credit. Prerequisite: CSci 151 or 212. (Spring)
- 178 **Database Systems I (3)** Narahari and Staff
Design and architecture of relational database systems. Query language, data models, data structures to minimize access time, relational data structures. Construction of a database management system. Prerequisite: CSci 161 or 210 and 212. (Fall)
- 180 **UNIX System Programming (3)** Maurer and Staff
Exposure to UNIX internals. Use of UNIX system calls and utilities in conjunction with script and C programs. RFCs, GNU project, and other collaborative traditions in the UNIX community. May be taken for graduate credit. Prerequisite: Senior status or 1 year of C programming and UNIX user experience. (Fall)
- 181 **Introduction to Computer Animation (3)** Hahn and Staff
Creation of artistic works using commercial 3-D animation packages. Principles of animation, including timing, exaggeration of motion, and anticipation. Use of 2-D paint and composition software. Modeling, motion, rendering, and editing in animation. May be taken for graduate credit. Prerequisite: CSci 141 or 210. (Spring)
- 183 **Computer Networks I (3)** Meltzer and Staff
Higher-layer protocols and network applications on the Internet, such as session layer, presentation layer, data encryption, directory services and reliable transfer services, telnet, network management, network measurements, e-mail systems, and error reporting. Prerequisite: CSci 141, 136. (Fall)
- 184 **Computer Networks II (3)** Meltzer and Staff
Computer networks and open system standards. Network configurations and signals, encoding and modulation, transmission media, connection interfaces, error detection and correction, signal compression, switching, link layer control, ISDN, X.25, frame relay, ATM, and Sonet. Bridges, routers, and routing algorithms. Prerequisite: CSci 183. (Spring)
- 185 **Computer Graphics I (3)** Sibert and Staff
Hardware; concepts of graphics subroutine packages; programming concepts for interaction, display, and data structuring; basic clipping and scan-conversion algorithms; homogeneous coordinates; three-dimensional viewing transforms; basic rendering. May be taken for graduate credit. Prerequisite: CSci 141 or 210. (Fall)
- 186 **Simulation Methods (3)** Bock and Staff
Computational methods for continuous and discrete system simulation. Effects of computer software and hardware architectures on computational precision and accuracy requirements. Random-number generation and testing. Calibration and scaling technique. Verification and validation technique. Prerequisite: CSci 131. (Spring)

- 187 Design of User-Interface Programs (3)** Sibert and Staff
Structure of interactive programs. Widgets, windows, and input devices. Client-server model, event-driven programming, and callbacks. Window systems (e.g., Xwindows) and dialog control. May be taken for graduate credit. Prerequisite: CSci 141 or 210. (Spring)
- 188 Software Design for Handheld Devices (3)** Maurer and Staff
Design of interactive software for handheld devices. Event driven programming, user interface design practices, memory management, handheld debugging techniques. May be taken for graduate credit. Prerequisite: CSci 141 or 210. (Spring)
- 189 Unix System Administration (3)** Maurer and Staff
System administration for the stand-alone system or small networks. Installation of two or more UNIX variants (Linux, FreeBSD, Solaris) on Intel or Sparc platforms. Configuration of mail, name services, and other network utilities. Backup and recovery, security and ethics. May be taken for graduate credit. Prerequisite: CSci 180. (Spring)
- 190 Real-Time Computer Systems (3)** Feldman
Development of software for real-time control of physical systems. Reliability and fault tolerance, exceptions and exception handling, reliability and concurrent processes, timeouts, deadline scheduling, shared-memory and message-based device drivers. May be taken for graduate credit. Prerequisite: CSci 131. (Spring)
- 194 Discrete Analysis in Computer Science (3)** Berkovich and Staff
Combinatorial theory: permutations and combinations, generating functions, recurrence relations, the principle of inclusion and exclusion. Block designs. Applications to the analysis of algorithms, computer organization, VLSI placement, coding theory, simulation, and other problems. May be taken for graduate credit. Prerequisite: CSci 123 or permission of instructor. (Fall)
- 195 Senior Computer Science Design Project I (3)** Meltzer and Staff
Conception, planning, design, and construction of a one-year project. Economic analysis of the product. Use of Gantt charts. Lectures on presentation techniques, project construction, ethics, and professionalism. Five project report presentations, using visual aids. Formal written reports. Start of the construction. Prerequisite: CSci 161, 169; and senior status. (Fall)
- 196 Senior Computer Science Design Project II (3)** Meltzer and Staff
Completion and demonstration of project started in CSci 163. Formal written reports, demonstrations, and oral presentations, using visual aids, of the progress of the project throughout the semester. Lectures on presentation techniques, ethics, project plans, testing procedures, user's manual, and user interfaces. Prerequisite: CSci 195. (Spring)
- 197 Special Topics (1 to 3)** Staff
Topic to be announced in the *Schedule of Classes*. (Fall and spring)
- 198 Research (1 to 3)** Staff
Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

COUNSELING/HUMAN AND ORGANIZATIONAL STUDIES

Programs in counseling are offered at the graduate level by the Graduate School of Education and Human Development through its Department of Counseling/Human and Organizational Studies. The following courses are available to undergraduates.

COUNSELING

- 162 Professional and Ethical Orientation to Counseling (3)** Staff
The roles and functions of a professional counselor and the ethical standards that govern the profession. (Fall, spring, and summer)
- 163 Psychosocial Adjustment (3)** Staff
Mental health problems: emphasis on needs of counselors, teachers, and others working with children and adolescents. (Fall)
- 175 Introduction to Rehabilitation Counseling (3)** Staff
Overview of rehabilitation profession, including philosophy, history, ethics, theory, legislation, settings, and practice. (Fall)

- 178 **Disability and Case Management (3)** Staff
Case management services for persons with physical, mental, and emotional disabilities. (Spring)
- 181 **Medical and Psychosocial Aspects of Disabilities (3)** Staff
Chronic and traumatic disorders with rehabilitation and psychosocial implications. (Fall)

CRIMINAL JUSTICE

See **Sociology**.

DANCE and DRAMA

See **Theatre and Dance**.

DRAMATIC LITERATURE

Committee on Dramatic Literature

N.C. Garner (*Chair*), R.L. Combs, G. Paster, W.A. Pucilowsky

Columbian College of Arts and Sciences offers an interdisciplinary program in dramatic literature leading to the degree of Bachelor of Arts. This major, which combines the strengths of the Departments of English and of Theatre and Dance, is designed to give equal consideration to the two key aspects of theatre—the literary text and the production.

Bachelor of Arts with a major in dramatic literature—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—A 6-credit sequence chosen from Engl 51–52, 61–62, 71–72, 73–74, 91–92; Hmn 1, 2; Honr 15–16.
3. Required courses for the major (42 credit hours):
 - (a) Engl 120, 127–28; Engl/TrDa 124; TrDa 145–46.
 - (b) 12 credit hours in drama courses or related topics selected from Clas 113; Engl 105, 108, 155, 156, 157, 158, 165, 166; Mus 121; Fren/Span 132.
 - (c) 12 credit hours in performance and production courses in the Department of Theatre and Dance, including TrDa 14, 130, 147.

EARLY MODERN EUROPEAN STUDIES

Committee on Early Modern European Studies

L.B. Salamon (*Chair*), I. Azar, I. Creppell, J. Heins, P. Jacks, R.E. Kennedy, Jr., M. Norton, L. Peck, D. Wallace, L. Youens

Columbian College of Arts and Sciences offers an interdisciplinary program in Early Modern European Studies. This humanities program is designed to enhance the student's understanding of the history, culture, politics, philosophy, religion, science, literature, and art of the five centuries (1300–1800) during which the Western world began to take on some of its modern dimensions. The program is directed by an interdepartmental committee.

Bachelor of Arts with a major in early modern European studies—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Hmn 2 or Honr 16; four semesters of study, or the equivalent, in a modern European language or Latin.
3. Requirements for the major (all courses are to be chosen in consultation with the advisor):
 - (a) 6 credits chosen from AH 104, 105; Hist 121, 123; PSc 106; Rel 145.
 - (b) 18 credits, consisting of two sets of 9 credits selected from two of the following four groups: Group A—Fren 53, 121, 122, 123; Ger 91, 171, 195; Ital 53, 120, 197; Span 53, 121, 122, 123; Group B—AH 104, 105, 106, 107, 108, 113, 114, 198; Mus 101–2; Group C—Engl 125, 127–28, 130, 131–32, 153, 155, 172; Clas 127; Group D—Hist 102, 121, 122, 123, 125, 141, 148, 151, 153, 154, 193.
 - (c) 6 credits chosen from the entire set of courses listed above or from approved departmental Special Topics or Independent Study courses.

Minor in early modern European studies—Requirements: Hmn 2 or Honr 16; four semesters of study in a modern European language, or three semesters of Latin, or the equiv-

alent; AH 104 or 105; one course chosen from Hist 121 or 123, PSc 106, or Rel 145; two additional courses chosen from 3(b) above.

EARTH AND ENVIRONMENTAL SCIENCES

Professors J.F. Lewis (*Chair*), G.C. Stephens, G.A. Goodfriend (*Research*)

Associate Professor R.P. Tollo

Assistant Professors A.V. Logan (*Research*), C.M. Fedo, J. Hanchar, H.H. Teng

Professorial Lecturers J.H. Kravitz, M.J. Baedeker

Associate Professorial Lecturers M.K. Brett-Surman, M.C. McGuire

Assistant Professorial Lecturers R. Seal, R.A. Ayuso

Lecturer R.T. Rye

Committee on Environmental Studies

H. Merchant (*Chair*), I.K. Cheung, B.M. Mergen, W.C. Parke, G.C. Stephens, A.M. Yezer

Committee on Environmental Science

J. Hanchar (*Chair*), C. Fedo, D. Fuller, J.H. Miller, R. Packer, A.M. Yezer

The Department of Earth and Environmental Sciences offers four undergraduate degree programs: the Bachelor of Arts and the Bachelor of Science with a major in geoscience, the Bachelor of Arts with a major in environmental studies, and the Bachelor of Science with a major in environmental science.

For both the Bachelor of Arts and the Bachelor of Science with a major in geoscience, three options are available. The Earth Materials and Processes option is designed to provide a strong foundation for students intending to pursue graduate study or employment in geology or applied geological science. The Earth-Water Interactions option is designed to provide an appropriately diverse background for pursuing graduate study or employment in water resources. The Earth and Biological Processes option is designed for students who plan to pursue careers involving the interaction of Earth's physical and biological systems.

The multidisciplinary program in environmental studies, leading to the Bachelor of Arts, integrates formal study in the natural and social sciences but emphasizes the contribution of the social sciences in the environmental decision-making process. The major serves as preparation toward analyzing broad-based environmental policy.

The multidisciplinary program in environmental science provides a broad basis in the physical and natural sciences. The program leads to the degree of Bachelor of Science, serving as preparation toward examining and evaluating processes and problems in the natural environment.

Bachelor of Arts or Bachelor of Science with a major in geoscience—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Required introductory courses—EES 1 and 2, or 2 and 5.
3. Required courses in related areas—(a) Chem 11–12; (b) BiSc 13 or equivalent or, with permission of the instructor, a 100-level BiSc course; (c) for the Bachelor of Science only, Math 20–21 or 31; and for both the Bachelor of Science and Bachelor of Arts, two courses chosen from Geog 2, Phys 1–2, Stat 91.
4. Required courses in the major—EES 111, 112, 122, 126, 140, and either 9 credits (for the Bachelor of Science) or 6 credits (for the Bachelor of Arts) chosen with prior approval of a departmental advisor from one of the options below. Students should check departmental and course prerequisites when selecting courses to fulfill their chosen option.
 - Earth Materials and Processes—EES 117, 118, 124, 125, 143, 189, 195; Chem 105; Geog 105, 106, 107, 134.
 - Earth-Water Interactions—EES 128, 143, 174, 189, 195; Chem 105; Geog 136.
 - Earth and Biological Processes—EES 125, 128, 151, 159, 195; Chem 151–52, 153–54; BiSc 130, 150, 151, 154, 155, 156, 157, 158, 159, 167, 168, 169.

Bachelor of Arts with a major in environmental studies—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses:
 - (a) Statistics—Stat 91.
 - (b) Natural sciences—6–8 credit hours selected from BiSc 13–14; Chem 11–12; EES 1 or 5 and 2; or Phys 1–2.

(c) Social sciences—Econ 11–12, plus 6 credit hours selected from Anth 1–2; Geog 1, 2; PSc 1, 2; Psc 1, 105–6; or Soc 1.

3. Required courses for the major (52 credit hours):

(a) BiSc 154; Econ 136; EES 191–92, 193; Geog 106 or 132.

(b) 9 credit hours selected from designated courses in biological sciences, chemistry, and geoscience.

(c) 24 credit hours selected in no more than two departments from designated courses in anthropology, economics, geography, political science, psychology, and sociology. Up to 6 hours of credit in EES 196–97 (or other approved field experience or internship courses) may be included in this category.

Bachelor of Science with a major in environmental science—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.

2. Prerequisite courses:

(a) Statistics—Stat 91.

(b) Natural sciences—12–18 credit hours selected from BiSc 13–14; Chem 11–12; EES 1–2; Phys 1–2. Either BiSc 13–14 or Chem 11–12 must be selected.

(c) Social sciences—Econ 11–12, plus 6 credit hours selected from Anth 1–2; Geog 1, 2, 3; PSc 1, 2; Psc 1, 105–6; Soc 1.

3. Required courses for the major (52 credit hours):

(a) BiSc 154; Econ 136; EES 191–92, 193; Geog 132 or 135.

(b) 24 credit hours selected from designated courses in biological sciences, chemistry, and geoscience. Up to 6 hours of credit in EES 196–97 (or other approved field experience or internship courses) may be included in this category.

(c) 9 credit hours selected in no more than two departments from designated courses in anthropology, geography, political science, psychology, and sociology.

For the two preceding degrees, the science and social science courses listed under 3(b) and 3(c) must be taken in not more than a total of three departments.

For graduation with Special Honors, a student must have an overall grade-point average of 3.3 plus the recommendation of the department; must take EES 199 for 2 or more credit hours; and must submit an approved honors thesis or project report.

Minor in geoscience—18 credit hours, including EES 1 and 2, or 2 and 5, plus 111, 122, 126, and one course selected with prior approval of a departmental academic advisor from courses required for the major in geoscience.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Note: Programs offered by the Department of Earth and Environmental Sciences are under development; please verify information here with the department.

1 Physical Geology (3)

Rye, Stephens, Tollo

Lecture, laboratory. An introduction to the principal features of the composition and structure of the earth. Topics include the nature of minerals and rocks, surface and deep earth processes, mineral and energy resources, and plate tectonics. Laboratory fee, \$35. Credit will not be given for both EES 1 and 5. (Fall and spring)

2 Environments of the Past (3)

Rye, Fedo

Lecture, laboratory. An introduction to the history of the earth. Topics include sedimentary environments, plate tectonics, origin of life, and evolution. Laboratory fee, \$35. Prerequisite: EES 1 or 5. (Fall and spring)

5 Environmental Geology (3)

Lewis, Hanchar, Teng

Lecture, laboratory. An introduction to the impact of geology on the environment, with emphasis on the relation of people and society to natural environments; population evolution, natural hazards, and mineral resources. Laboratory fee, \$35. Credit will not be given for both EES 1 and 5. (Fall and spring)

105 Geological Hazards in Land-Use Planning (3)

Staff

Lecture and laboratory. An analysis of geological hazards and related factors that affect land-use planning. Field trip. Prerequisite: EES 1 or 5 or permission of instructor. Laboratory fee, \$30. (Spring)

- 111 Mineralogy (4)** Tollo
Lecture and laboratory. Introduction to the crystallography and chemical systematics of rock-forming and exotic minerals. Exercises emphasize the analysis of mineralogic data and the paragenesis of mineral assemblages. Prerequisite: EES 1 or 5 or permission of instructor. Laboratory fee, \$30. (Fall)
- 112 Optical Mineralogy (4)** Tollo
Lecture and laboratory. Introduction to basic light theory and the identification and characterization of minerals through optical properties. Laboratory exercises provide an introduction to petrologic analysis of igneous and metamorphic mineral systems. Prerequisite: EES 111 or permission of the instructor. Laboratory fee, \$30. (Spring)
- 117 Petrology (2)** Lewis
Introduction to silicate phase systems; physics and chemistry of crustal and magmatic processes; volcanic processes and products. Prerequisite: EES 111, 112; or permission of instructor. (Fall)
- 118 Petrology Laboratory (2)** Lewis
Concurrent registration in EES 117 required for geoscience majors. Prerequisite: EES 111 and 112. Laboratory fee, \$35. (Fall)
- 122 Structural Geology (3)** Stephens
Lecture and laboratory. Study of natural and experimental rock deformation and the relationships between stress and strain as recorded by geologic structures. Prerequisite: EES 1 or 5. Laboratory fee, \$25. (Fall)
- 124 Digital Mapping for the Natural Sciences (3)** Stephens
Principles of surveying, GPS, data structuring, and GIS compilation. Field and laboratory exercises. Laboratory fee, \$30. (Spring, odd years)
- 125 Marine Geology (3)** Kravitz
Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: EES 1 or 5 or permission of instructor. (Spring)
- 126 Sedimentology and Stratigraphy (4)** Fedo
Introduction to sedimentation and stratigraphy; origin and classification of sediments and sedimentary rocks; introduction to clastic and carbonate depositional environments and stratigraphic principles. Prerequisite: Chem 11; EES 2, 111. (Fall)
- 128 Geomorphology (3)** Stephens
Lecture (2 hours), laboratory (2 hours). Understanding the nature, origin, and development of landforms in the field and through the use of maps and aerial photos. Prerequisite: EES 1 or 5. Laboratory fee, \$30. (Spring, even years)
- 131 Global Climate Change (3)** Goodfriend
Fundamental causes and patterns of climate change. Methods of reconstruction of past climates; modeling and predicting climate change. (Spring)
- 140 Introduction to Geochemistry (3)** Hanchar
Chemical systems and processes on the planet Earth; origins and interactions among and within the Earth's lithosphere, oceans, and atmosphere; origin, distribution, and behavior of the elements, radioactive and stable isotope systems. Prerequisite: Chem 11-12 or equivalent.
- 143 Aqueous Geochemistry (3)** Teng
Application of chemical principles to the study of natural waters. Impact of natural and anthropomorphic factors on quality and chemistry. Prerequisite: EES 140, Chem 11-12, or equivalent.
- 150 Dinosaurs: Evolution and Natural History (3)** Brett-Surman
An introductory course on the natural history of dinosaurs—their evolution, biology, and ecology; their false portrayal in the press, and how scientists study them. (Summer)
- 151 Invertebrate Paleontology (3)** Staff
Lecture and laboratory. Review of major invertebrate fossil groups. Uses of fossils in studies of macroevolution, paleoecology, biostratigraphy, tectonics, and climatology. Field trips as arranged. Prerequisite: EES 1 and 2 or 2 and 5 or permission of instructor. Laboratory fee, \$30. (Fall)
- 154 Vertebrate Paleontology (3)** Brett-Surman
Lecture (2 hours), laboratory or field work as arranged. General features of vertebrate morphology and evolution; problems of paleoecology and adaptation. (Fall, odd years)

- 159 **Geobotanical Ecology of the Central Appalachians** (4) Tollo, Wells
A multidisciplinary approach to Appalachian ecology involving application of scientific principles from both geology and botany, stressing interrelationships between geological, geochemical, and biological processes. Biweekly field trips. Prerequisite: EES 1 or 5 and BiSc 13-14; or equivalent with permission of instructor. Same as BiSc 159. (Spring, odd years)
- 174 **Introduction to Hydrogeology** (3) Hanchar
Occurrence, storage, movement, quality, pollution, and the hydrologic properties of subsurface water. Prerequisite: EES 1 or 5.
- 189 **Environmental Geophysics** (3) Stephens
Principles of magnetic, gravity, seismic and electrical methods applied to geological problem-solving. Prerequisite: EES 122 or permission of instructor. (Spring)
- 191-92 **Senior Seminar in Environmental Studies** (3-3) Merchant
Directed reading and discussion of contemporary environmental problems. Limited to majors in environmental studies or environmental science or with permission of instructor.
- 193 **Introduction to Environmental Law** (3) McGuirl
An introduction to selected pieces of major environmental legislation. The role of the courts and bureaucracy in implementing and interpreting legislation. Impact on decision making. (Fall)
- 195 **Field Methods** (3) Tollo
Weekend field trips. Methods of outcrop analysis, geologic mapping, and data interpretation. The geological evolution of the central Appalachian mountains is emphasized. Laboratory fee (field trip fee), \$30. (Spring)
- 196-97 **Field Experience** (3-3) Staff
Open to juniors and seniors majoring in environmental studies and environmental science. Students spend at least eight hours per week in a political, technical, legal, or special-interest organization working on environmental questions.
- 199 **Undergraduate Research or Reading** (arr.) Staff
Problems approved by the staff. May be repeated once for credit.

EAST ASIAN LANGUAGES AND LITERATURES

Professors J. Chaves (Chair), Y.-K. Kim-Renaud
Associate Professors D.L. Lee, G.C.Y. Wang, S. Hamano
Assistant Professor I.L. Hanami
Adjunct Assistant Professor M. Frost

Bachelor of Arts with a major in Chinese language and literature—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Chin 5-6 (preferred); or Chin 1-2, 3-4.
3. Required for the major—Chin 11-12, 107-8, 109-10, and 6 hours selected from Chin 161, 163-64; plus 12 additional credit hours of 100-level Chinese courses.

Bachelor of Arts with a major in Japanese language and literature—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Japn 1-2, 3-4; or equivalent.
3. Required for the major—Japn 7-8, 111-12, 199-200; 15 hours selected from Japn 107-8, 109-10, 162, 185-86; 9 hours in related courses outside department (e.g., Art 187; Econ 170; Hist 127, 189, 195, 196; PSc 175; Rel 160).

Minor in Chinese language and literature—Prerequisite: 18-22 credit hours, including either Chin 1-2, 3-4, and 11 or Chin 5-6 and 11. The minor consists of 12 additional credit hours selected from Chin 12, 107-8, 109-10, 123-24, 136, 161, 163-64, and 179-80.

Minor in Japanese language and literature—Prerequisite: Japn 1-2, 3-4; or equivalent. The minor consists of Japn 7-8 and 12 additional credit hours selected from Japn 107-8, 109-10, 111-12, 162, 185-86, and 199-200.

Minor in Korean language and literature—Prerequisite: Kor 1-2, 3-4; or equivalent. The minor consists of Kor 5-6, 7-8, and 111-12.

CHINESE

- 1-2 Basic Chinese (4-4)** Wang
Fundamentals of grammar and pronunciation, with graded reading and practice in writing. Laboratory fee, \$50 per semester. (Academic year)
- 3-4 Basic Chinese (4-4)** Wang
Continuation of grammar, with emphasis on speaking, reading, and writing. Laboratory fee, \$50 per semester. (Academic year)
- 5-6 Intensive Basic Chinese (8-8)** Lee
Intensive beginner's course in fundamentals of grammar and pronunciation, with graded reading and practice in writing. Laboratory fee, \$70 per semester. (Academic year)
- 10 Chinese Calligraphy (1)** Staff
Writing of Chinese characters with traditional writing implements. No knowledge of the language required. May be repeated for credit. (Fall and spring)
- 11-12 Intensive Intermediate Chinese (6-6)** Wang
Reading of basic texts, writing of short pieces, conversation, systematic review of grammar. Prerequisite to Chin 11: Chin 6. Laboratory fee, \$70 per semester. (Academic year)
- 22 Intermediate Chinese Conversation (3)** Staff
A practical course for improving speaking ability. Prerequisite: 6 credit hours of Chinese or equivalent. May be repeated for credit. Laboratory fee, \$50. (Fall and spring)
- 107-8 Readings in Modern Chinese (3-3)** Lee
Readings in selected modern literary works, social science materials, and documentary materials. Prerequisite: Chin 12 or equivalent. (Academic year)
- 109-10 Introduction to Classical Chinese (3-3)** Chaves
Introduction to classical writings in Chinese literature, history, and philosophy. Prerequisite: Chin 6. (Alternate academic years)
- 123-24 Introduction to Chinese Linguistics (3-3)** Lee
Introduction to the history of the Chinese language. Analysis of linguistic structure of modern spoken Chinese and classical Chinese. Lectures and discussion in English. Prerequisite: Chin 6 or equivalent, or a course in linguistics. (Alternate academic years)
- 136 Chinese Women in Myth, Literature, and Film (3)** Frost
Women's position in Chinese cultural and political life from prehistoric myth to the present time. Confucian writing, traditional theatre, and films and novels set in China. A general survey of Chinese history establishes the context for discussions of cultural and political phenomena, such as foot binding and the one-child policy. Same as WStu 136.
- 161 Chinese Culture Through Film (3)** Frost
Survey of the Chinese cultural heritage presented through films. Topics include literature, philosophy, art, religion, and social history from prehistorical times to the modern era. Lectures and discussion in English. (Fall and spring)
- 163-64 Chinese Literature in Translation (3-3)** Chaves
An introductory course focusing on major works of poetry, drama, and the novel in their historical and social context. (Academic year)
- 171-72 Poetry of the Tang and Song Periods (3-3)** Chaves
Reading of works of leading poets. Discussion of content and style. Prerequisite: Chin 109 or equivalent. (Alternate academic years)
- 185-86 Directed Reading (3-3)** Staff
Reading of material in the student's field of interest. Admission by permission of instructor. (Academic year)
- 199 Proseminar: Readings for the Major in Chinese Language and Literature (3)** Staff
Admission by permission of instructor. May be repeated for credit.

JAPANESE

- 1-2 Basic Japanese (4-4)** Hamano and Staff
Fundamentals of grammar and pronunciation, with graded reading and practice in writing. Laboratory fee, \$50 per semester. (Academic year)

- 3-4 **Basic Japanese (4-4)** Hamano and Staff
Continuation of grammar, with emphasis on speaking, reading, and writing. Laboratory fee, \$50 per semester. (Academic year)
- 7-8 **Intermediate Japanese (3-3)** Hamano, Hanami
Continuation of reading of basic texts, writing of short pieces, conversation, systematic review of grammar. Laboratory fee, \$50 per semester. (Academic year)
- 9-10 **Intensive Basic Japanese (8-8)** Staff
Intensive beginner's course in fundamentals of grammar and pronunciation, with graded reading and practice in writing. Laboratory fee, \$70 per semester. (Academic year)
- 107-8 **Readings in Modern Japanese (3-3)** Hamano, Hanami
Readings in selected modern literary works, social science materials, and documentary materials. Prerequisite: Japn 8 or equivalent. (Academic year)
- 109-10 **Introduction to Classical Japanese (3-3)** Hanami
Introduction to classical writings in Japanese literature, history, and philosophy. Prerequisite: Japn 8; Japn 109 is prerequisite to Japn 110. (Academic year)
- 111-12 **Japanese Literature in Translation (3-3)** Chaves
An introductory survey of traditional and modern Japanese literature read in English translation: love and nature poetry; theater (classical drama, puppet plays); fiction; diaries. (Academic year)
- 162 **Japanese Culture Through Film (3)** Hanami
Survey of the Japanese cultural heritage presented through films. Topics include literature, philosophy, art, religion, and social history from prehistorical times to the modern era. Lectures and discussion in English. (Spring)
- 185-86 **Directed Reading (3-3)** Hanami and Staff
Reading of material in the student's field of interest. Admission by permission of instructor. (Academic year)
- 199 **Proseminar: Readings for the Major in Japanese Language and Literature (3)** Staff
Admission by permission of instructor. May be repeated for credit.

KOREAN

- 1-2 **Basic Korean (4-4)** Kim-Renaud
Fundamentals of grammar and pronunciation, with graded speaking, reading, and writing practice. Laboratory fee, \$50 per semester. (Academic year)
- 3-4 **Basic Korean (4-4)** Kim-Renaud
Continuation of grammar, with emphasis on speaking, reading, and writing. Laboratory fee, \$50 per semester. (Academic year)
- 5-6 **Intermediate Korean (3-3)** Kim-Renaud
Reading of basic texts, writing of short pieces, conversation, systematic review of grammar. Laboratory fee, \$50 per semester. (Academic year)
- 7-8 **Intermediate Korean (3-3)** Kim-Renaud
Continuation of reading of basic texts, writing of short pieces, conversation, systematic review of grammar. Laboratory fee, \$50 per semester. (Academic year)
- 111-12 **Korean Literature in Translation (3-3)** Kim-Renaud
An introductory survey of Korean literature read in English translation. Kor 111: traditional poetry, fiction, storytelling, drama, diaries. Kor 112: modern fiction, drama, poetry, screenplays. (Academic year)

VIETNAMESE

- 1-2 **Basic Vietnamese (4-4)** Staff
Fundamentals of grammar and pronunciation, with an introduction to reading and writing. (Academic year)
- 3-4 **Basic Vietnamese (4-4)** Staff
Continuation of grammar, with emphasis on speaking, reading, and writing. (Academic year)

ECONOMICS

Professors J.L. Gastwirth, R.M. Dunn, Jr., R.S. Goldfarb, A.M. Yezer, J.J. Cordes, J. Pelzman, R.P. Trost, B.L. Boulier, H.S. Watson (*Chair*), M.D. Bradley, J.R. Millar, S.C. Smith, A. Klammer (*Research*), P. Labadie, G.L. Kaminsky, D.O. Parsons, R.F. Phillips
Associate Professors A.S. Malik, F.L. Joutz, M.O. Moore, S.M. Suranovic, S. Joshi, N. Vonortas, C.M. Snyder, D. Ribar, H. Wolf
Assistant Professors V. Fon, J. Soares, D.M. Stryk, R.M. Samaniego
Adjunct Professors J. Hardt, E.H. Solomon, S.N. Kirby

Bachelor of Arts with a major in economics—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. **Prerequisite courses—Econ 11–12.**
3. Required courses in related areas—Math 21, 31, or 52; Stat 111 and 112, or equivalent; **6 credit hours of a social science other than economics.**
4. Required courses in the major—Econ 101, 102, 121, 198, and five additional 100-level economics courses to be approved by the departmental advisor. Grades of C- or better are required in Econ 101 and 102. A maximum of three regional courses (Econ 133, 169, 170, 185) can be counted toward the five additional courses.

Bachelor of Science with a major in economics—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. **Prerequisite courses—Econ 11–12.**
3. Required courses in related areas—Math 31 and 32, or equivalent; Stat 111 and 112, or equivalent; 6 hours of additional course work in mathematics, statistics, or computer science, to be approved by the departmental advisor (e.g., Math 33, 124, 125, 142; Stat 157, 158, 181, 183; Econ 214, 215, 275).
4. Required courses in the major—Econ 101, 102, 121, 123, 198, and four additional 100-level economics courses to be approved by the departmental advisor. Grades of C- or better are required in Econ 101 and 102. A maximum of three regional courses (Econ 133, 169, 170, 185) can be counted toward the four additional courses.

Five-Year Bachelor of Science with a major in economics and Master of Arts in the field of economics—Students interested in this joint degree program should consult the undergraduate program advisor and the M.A. program advisor as soon as possible. Timely completion of requirements should allow the student to receive both degrees within five years.

Bachelor of Science with a major in economics—The following requirements must be fulfilled:

1. All requirements listed under the Bachelor of Science degree with a major in economics. It is desirable that students complete Math 31 and 32 (or an equivalent sequence), Stat 111 and 112 (or an equivalent sequence), and Econ 101 and 102 by the end of their fifth semester. During their sixth semester, students should begin the process of applying to the M.A. program.
2. Econ 203–4 and 205, microeconomic and macroeconomic theory.

Master of Arts in the field of economics—Required: completion of M.A. option A or B. See the Graduate Programs Bulletin.

Special Honors—Students may apply for graduation with Special Honors. To be eligible, a student must meet the requirements for Special Honors stated under University Regulations, must have a grade-point average of at least 3.5 in economics courses, and must submit an honors paper to the department. Upon review of the honors paper, the student may be recommended for graduation with Special Honors.

Minor in economics—(a) 18 credit hours in economics, including Econ 11–12, 101, 102, 121, and one other approved 100-level course in economics; (b) one of the following: 6 credit hours of an approved statistics sequence, such as Stat 111, 112; or 6 hours of an approved mathematics sequence, such as Math 31, 32; or one approved statistics course, such as Stat 111, and one approved mathematics course, such as Math 31 or 52; or one approved mathematics course or one approved statistics course and one additional 100-level course in economics (other than Econ 133, 134, 169, 170, 171, or 185). Grades of C- or better are required in Econ 101 and 102. Stat 129 cannot be used to satisfy the requirements of the minor.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Departmental prerequisite: Econ 11-12 is prerequisite to all other courses offered by the Department of Economics.

- 11-12 Principles of Economics (3-3)** Bradley, Dunn, Goldfarb, Trost, Yezer
Major economic principles, institutions, and problems in contemporary life. Econ 11: Microeconomics—supply and demand, the price system and how it works, competitive and monopolistic markets. Econ 12: Macroeconomics—national income concepts, unemployment and inflation, institutions of monetary control. Econ 11 is prerequisite to Econ 12. (Econ 11 and 12—fall and spring)
- 101 Intermediate Microeconomic Theory (3)** Fon, Goldfarb, Joshi, Malik, Phillips, Snyder, Vonortas
Analysis of household economic behavior, including derivation of demand functions. Analysis of firm behavior, including derivation of supply frameworks. Demand and supply interaction under various market structures and in factor markets. (Fall and spring)
- 102 Intermediate Macroeconomic Theory (3)** Bradley, Joutz
Investigation of the determinants of national income, inflation, unemployment, and interest rates. Alternative business cycle theories, with emphasis on the role of imperfect information, uncertainty, and expectations. (Fall and spring)
- 104 History of Economic Thought (3)** Staff
History of the major schools of economic thought, influence of changing problems on the development of economic theory. Prerequisite: Econ 101, 102.
- 105 Economic Conditions Analysis and Forecasting (3)** Staff
Theory and empirical analyses of economic trends and fluctuations; use of economic indicators and simple econometric models. (Fall)
- 121 Money and Banking (3)** Joutz
The role of money, credit, interest rates, foreign exchange rates, and commercial banks and other financial institutions in the U.S. economy. (Fall and spring)
- 122 Monetary Theory and Policy (3)** Solomon
Analysis of classic and modern monetary theories and their application to current economic conditions. The links between theory and policy. The altered role of money over time; the new money technology. (Spring)
- 123 Introduction to Econometrics (3)** Trost, Phillips
Joint offering of the Economics and Statistics Departments. Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Math 31; Stat 112. (Fall and spring)
- 133 Economies of the Former Soviet Union and Eastern Europe (3)** Millar
Analysis of the transition process in the former Soviet Union and Eastern Europe. Topics include economic models of planned economies and comparative analysis of economic development programs of the newly independent states and Eastern Europe. (Fall)
- 136 Natural Resources and Environmental Economics (3)** Malik
Analysis of market mechanisms that allocate energy and natural and environmental resources; investigation of actual and optimal resource allocation across uses and time; review of arguments for public intervention. (Spring)
- 142 Labor Economics (3)** Staff
Analysis of labor supply and demand; measurement and theory of unemployment; occupational choice; wage differentials; labor market issues and policies. (Fall)
- 148 Health Economics (3)** Baily
Economic analysis of the determinants of demand, supply, output, and distribution in the health care sector, with special emphasis on current policy issues of access, quality, and cost. (Spring)
- 151 Economic Development (3)** Jain, Smith
Theories and empirical studies of the economic problems of developing countries. (Fall and spring)

- 153 **Income Distribution (3)** Staff
An analysis of the distribution of income, with focus on issues relating to wealth and poverty. (Spring)
- 157 **Urban and Regional Economics (3)** Yezer
Analysis of the determinants of urban growth and development; firm location; the functioning of urban land and housing markets.
- 158 **Industrial Organization (3)** Kwoka, Snyder
Analysis of market structure, conduct, and performance of firms in a market economy, with emphasis on case studies of U.S. industries. (Fall)
- 159 **Government Regulation of the Economy (3)** Kwoka
Economic analysis of antitrust and regulation in the American economy. Prerequisite: Econ 101 or 158. (Spring)
- 160 **Survey of Finance and Engineering Economics (3)**
Same as EMSE 260.
- 161 **Public Finance I (3)** Cordes, Watson
Economic analysis of government spending and social regulation programs. Topics include public goods, externalities, income transfer and social insurance programs, and benefit-cost analysis of government programs. (Fall)
- 162 **Public Finance II (3)** Cordes, Watson
Economic analysis of taxes and government deficits. Topics include individual and corporate income taxes, payroll taxes, sales and excise taxes, property and wealth taxes, design of tax systems, and effects of taxation on labor and capital markets. (Spring)
- 165 **Economics of Human Resources (3)** Boulier
Economic analysis of education and training, labor market discrimination, marriage and the family, and social security. (Fall)
- 167 **Economics of Crime (3)** Yezer
Analysis of crime, both empirical and theoretical, that examines the links between law and economics, the economics of criminal participation, and the economics of law enforcement. (Spring)
- 169 **Introduction to the Economy of China (3)** Staff
Background, organization, and operation of the economy. Appraisal of performance and analysis of problems of development. (Fall)
- 170 **Introduction to the Economy of Japan (3)** Staff
Analysis of the structure and growth of the Japanese economy. (Spring)
- 181-82 **International Economics (3-3)** Dunn, Moore, Suranovic, Pelzman
Econ 181: International trade theory and policy. Econ 182: International macroeconomic theory and policy. (Academic year)
- 185 **Economic History and Problems of Latin America (3)** Staff
Analysis of present structures and problems of Latin American economies.
- 195 **Special Topics (3)** Staff
Topics vary, depending on current issues of interest and faculty availability.
- 198 **Proseminar (3)** Boulier, Bradley, Cordes, Fon, Goldfarb, Suranovic, Watson
Preparation and presentation of a research paper in any field of economics agreed upon by student and instructor. Review of selected topics in contemporary economics. Open only to economics majors in their senior year.
- 199 **Independent Research (3)** Staff
Prerequisite: Completion of 12 hours of 100-level economics courses, including Econ 101 and 102, with a minimum grade-point average of 3.4; and approval of an independent research project by a faculty member of the Economics Department.

EDUCATIONAL LEADERSHIP

Programs in educational leadership are offered at the graduate level by the Graduate School of Education and Human Development. The following courses are open to undergraduates.

- 104 **Psychology for Learning and Teaching (3)** Staff
Principles, theory, nature, and course of learning and teaching processes. Examination and analysis of the strategies and dynamics of teaching and learning in behavioral settings. Thirty hours of fieldwork in an educational setting. (Fall and spring)

- 125 Museums as Cultural and Educational Resources (3)** Staff
A general introduction to museums as institutions, sources of information, and places for enjoyment. Classes will take place on campus and at art, history, and science museums in the metropolitan area. Admission by permission of instructor. (Spring)
- 180 Computer Literacy (3)** Staff
Word-processing, desktop publishing, graphics, database management, spreadsheets, charting, and communications software are introduced through reading, demonstrations, and hands-on activities in a computer classroom. Use of the Internet and the World Wide Web. No previous computer experience required. (Fall, spring, and summer)

ELECTRICAL AND COMPUTER ENGINEERING

Professors W.K. Kahn, R.L. Pickholtz, H.J. Helgert, R.H. Lang, N. Kyriakopoulos, T.N. Lee, E. Della Torre, R.J. Harrington, W. Wasylkiwskyj, N.A. Alexandridis, M.H. Loew, R.L. Carroll, Jr., M.E. Zaghloul, M. Pardavi-Horvath, B.I. Edelson (*Research*), B.R. Vojcic (*Chair*), H. Szu (*Research*), D. Nagel (*Research*), J.N. Pelton (*Research*)
Associate Professors D. Saha, K.B. Eom, C.E. Korman, M. Doroslovacki, T. El-Ghazawi
Assistant Professors Z. Guo, S. Subramaniam
Adjunct Professors A. Schneider, W.D. Jackson, G.R. Heidbreder, O.S. Mazzoni, W.W. Wu, A.F. Ghais, D.M. Le Vine
Adjunct Assistant Professor S. Ahmadi
Professorial Lecturers A.K. Mehrotra, J.B. Williamson, P.C. Hershey
Associate Professorial Lecturers E.A. Walker, J.J. Knab, M.R. Berman
Assistant Professorial Lecturers G. Mitchell, B.K. Yi, M.P. Carley, A. Goldschen, U.D. Patel

See the School of Engineering and Applied Science for programs of study leading to the Bachelor of Science (Electrical Engineering), and Bachelor of Science (Computer Engineering).

- 1 Introduction to Electrical and Computer Engineering (1)** Korman and Staff
A survey of several aspects of electrical and computer engineering, including applications in communications, computer networks, computer design, VLSI design, and biomedical engineering. Hands-on demonstrations and class projects that demonstrate the basic concepts and design of circuits and systems. (Fall)
- 11 Circuit Theory (4)** Zaghloul and Staff
Lecture (3 hours), laboratory (3 hours). Circuit elements, techniques of circuit analysis; circuit theorems; operational amplifiers; RLC circuits; natural and step responses; series, parallel and resonant circuits; sinusoidal steady-state analysis; phasors; power calculations; transformers; two-port circuits. CAD tools used in circuit projects. (Fall and spring)
- 12 Circuits, Signals, and Systems (3)** Kyriakopoulos and Staff
Dynamic state equations; circuit analysis using Laplace transforms; transfer functions; poles and zeroes; Bode diagrams; effects of feedback on circuits; convolution; Fourier series, integral and transforms; design of filters; CAD tools used in design of projects. Prerequisite: ECE 11. (Fall and spring)
- 20 Engineering Electronics (4)** Korman and Staff
Lecture (3 hours), laboratory (3 hours). Solid-state devices used in electronic engineering. Physics of their operation. Application to electronic circuits. Primary emphasis on application of these elements in power supplies and in linear amplifiers. Design concepts through use of SPICE and graphical techniques. Prerequisite: ECE 11. (Fall and spring)
- 30 Introduction to Electromagnetics (3)** Lang and Staff
Maxwell's equations, pulse propagation in one dimension, transmission line equations, reflection coefficient, capacitance and inductance calculations, Smith chart, plane waves, reflection from a dielectric, of fiber and integrated optics. Prerequisite: ApSc 113, Phys 22. (Fall)
- 31 Fields and Waves I (3)** Kahn and Staff
Review of vector calculus, orthogonal coordinates. Coulomb and Gauss laws, solid angle, scalar potential, dipoles, method of images, dielectrics, capacitance, Laplace and Poisson equations, boundary-value problems, numerical solutions with applications. Prerequisite: ApSc 113; Phys 22. (Spring)

- 32 Fields and Waves II (3)** Kahn and Staff
Currents, introduction to electrical transmission lines, impedance matching, Smith chart, Biot-Savart law, Ampere law, vector potential, magnets, magnetic circuits for power transformers, Maxwell's equations, plane waves, Poynting vector with applications. Prerequisite: ApSc 114, ECE 31. (Fall)
- 114 Analog Signals and Systems (3)** Lee and Staff
Applications of matrix theory and linear graphs to electrical network analysis; network equations; state-space formulation and solution, Fourier transforms and spectra in electrical systems, Network functions; analysis and synthesis of analog filters, the approximation problem; realization of filters. Prerequisite: ECE 12, 20. (Fall)
- 117 Introduction to Digital Signal Processing (3)** Kyriakopoulos, Doroslovacki, and Staff
Signal representation, sampling and quantization, discrete-time signals, z-transforms and spectra, difference equations, Discrete Fourier transform, IIR and FIR filter design. (Fall)
- 121 Analog Electronics Design (4)** Korman and Staff
Lecture (3 hours), laboratory (3 hours). Design, testing, and measurement of analog electronic circuits. Differential and multistage amplifiers. Output stages and power amplifiers. Frequency response of amplifiers, high-frequency models of FETs and BJTs. Introduction to feedback circuit topologies. Use of electronic CAD tools, such as P-SPICE. Prerequisite: ECE 20. (Spring)
- 122 Digital Electronics and Design (4)** Korman and Staff
Lecture (3 hours), laboratory (3 hours). Design and testing of logic gates, regenerative logic circuits, and semiconductor memory circuits. Implementation of such circuits with NMOS, CMOS, TTL, and other integrated circuit technologies. Use of electronic CAD tools, such as P-SPICE. Prerequisite: ECE 20, 140. (Fall)
- 126 VLSI Design and Simulation (3)** Zaghoul and Staff
Design of VLSI circuits. Stick diagramming, NMOS transistors, switch and gate logic, PLAs, finite-state machines, design rules, CAD system, speed and power considerations, floor planning, layout techniques. The student will design a VLSI circuit and simulate the design. May be taken for graduate credit. Prerequisite: ECE 122, 162. (Spring)
- 127 VLSI Fabrication Techniques (3)** Zaghoul and Staff
Choice of circuit technologies, process technologies associated with various types of components. Fabrication of VLSI, two basic MOS technologies and other available technologies, oxidation, photoengraving, chemical etching, diffusion. May be taken for graduate credit. Prerequisite: ECE 122, 140. (Spring)
- 128 Design and Testing of VLSI Circuits (3)** Zaghoul and Staff
Continuation of ECE 126. ASIC design methodology, use of ASIC design CAD tools. Introduction to logic synthesis, styles of synthesis, power/area/speed constraints. Introduction to VLSI testing, fault models, design for testability techniques, scan path, JTAG, and built-in self-test. Students must test the chips previously designed in ECE 126. May be taken for graduate credit. Prerequisite: ECE 126. (Fall)
- 134 Optical Systems (3)** Pardavi-Horvath and Staff
Introduction to the design of optical systems. Review of geometric optics, rays, and waves. Types of optical fibers, index and gradient index. Structure of beam waveguides. Gaussian beams. Design of lasers. Coherence and polarization, holographic systems. Fourier transforms and optical filtering. Coupled modes. Design of optical components. Prerequisite: ApSc 114; ECE 30 or 32. (Spring)
- 140 Design of Logic Systems I (4)** Zaghoul and Staff
Lecture (3 hours), laboratory (3 hours). Boolean algebra; combinational and sequential circuits; minimization techniques; design-and-build logic subsystems, such as decoders, multiplexers, adders, and multipliers; use of CAD tools. Corequisite: ECE 20. (Spring)
- 141 Microprocessors: Software, Hardware, and Interfacing (3)** Guo and Staff
Microprocessor architecture, assembly language, address decoding, hardware interrupt, parallel and serial interfacing with various circuits, timer/counters, direct memory access, microprocessor-based system. Hands-on laboratory experience is an integral part of this course. Prerequisite: ECE 140. (Fall)

- 143 Communications Engineering (3)** Doroslovacki and Staff
Fourier series and Fourier transform in relation to signal analysis. Convolution and linear filtering. Signal bandwidth and sampling theorem. Analog modulation. Random variables and stochastic processes; power spectrum. Digital modulation: BPSK, QPSK, MSK. Pulse code modulation, DPCM and delta modulation. Prerequisite: ApSc 115, ECE 12; corequisite: ECE 122. (Fall)
- 144 Introduction to Computer Networks (3)** Doroslovacki and Staff
Types of communication networks. Circuit and packet switching. Layered network architectures. Electrical interfaces. Parity checking and CRC error detection codes. Automatic-repeat-request protocols. Routing. Flow and congestion control. Multiple-access protocols. LAN standards. Internetworking and transport layer protocol—TCP/IP. ISDN, SONET, and ATM. Prerequisite: ApSc 115. (Spring)
- 146 Communications Laboratory (1)** Doroslovacki and Staff
Experiments supporting communications systems. Fourier analysis and Fourier transform. Sampling theorem, filtering, and aliasing. Amplitude modulation (AM), frequency modulation (FM), quantization, and pulse code modulation (PCM). Delta modulation. Binary phase shift keying (BPSK). Quadrature phase shift keying (PSK). Corequisite: ECE 143. (Fall)
- 147 Data Communications Laboratory (1)** Doroslovacki and Staff
Experiments in support of the analysis and design of communications systems with emphasis on network protocols. Time and frequency division multiplexing, flow control, automatic repeat request, interfacing, token ring, token bus, multiple access for Ethernet, routing, packet switching. Prerequisite or corequisite: ECE 144. (Spring)
- 148 Simulation of Communications Systems (3)** Vojcic
Representation and simulation of deterministic and random signals and systems. Modeling of communication systems; performance measures and statistical methods for the interpretation of simulation results. Simulation techniques and technology in communications. Case studies. Corequisite: ECE 144 or equivalent. May be taken for graduate credit. (Spring)
- 160 Modern Measurements and Sensors (3)** Pardavi-Horvath and Staff
Measurement of dc, ac, and high-frequency signals. Interfacing with a microcomputer. Interface electronic circuits. Sensors for measurement of mechanical, optical, magnetic, electromagnetic, thermal, chemical, and biochemical signals. Prerequisite: ECE 32, 121, 140. (Fall)
- 161 Introduction to Embedded Systems (3)** Guo and Staff
Microcontrollers and their application in embedded systems. Topics include assembly and C for microcontroller programming, serial and parallel I/O interfacing, and multimedia interfacing. Students perform laboratory experiments and a final project to develop a microcontroller-based embedded system. Prerequisite: CSci 49, ECE 141. (Spring)
- 162 Design of Logic Systems II (4)** Zaghloul and Staff
Lecture (3 hours), laboratory (3 hours). Introduction of ASIC design techniques; design and programming of FPGAs using CAD tools; timing in sequential circuits; essential hazards; races in sequential circuits; design-and-build FPGA project. Prerequisite: ECE 140. (Fall)
- 163 Senior Electrical and Computer Engineering Design Project Laboratory I (3)** Staff
Conception, planning, design, and construction of a one-year project. Economic analysis of the product. Use of Gantt charts. Lectures on presentation techniques, safety, grounding, project construction, and professionalism. Five project report presentations, using visual aids. Formal written reports. Prerequisite: senior status. (Fall)
- 164 Senior Electrical and Computer Engineering Design Project Laboratory II (3)** Staff
Completion and demonstration of project started in ECE 163. Formal written reports, demonstrations, and oral presentations, using visual aids, of the progress of the project throughout the semester. Lectures on presentation techniques, project plans, packaging, board layout, testing procedures, user's manual, and user interfaces. Prerequisite: ECE 163. (Spring)

- 166 Electrical Power Laboratory (1)** Harrington and Staff
Experiments in support of the analysis and design of electrical power systems. Measurements of the characteristics of devices to generate electric power. Rectification and inversion processes for power systems and drives. Prerequisite or corequisite: ECE 67, 177. (Fall)
- 168 Microwave and Optics Laboratory (1)** Lang
Experiments in transmission lines, network analyzer measurements of scattering parameters, microwave systems, fiber-optic systems and antennas. Introduction to the characteristics of laser and optical systems. Prerequisite: ECE 32. (Spring)
- 170 Computer Engineering Laboratory I (1)** Zaghloul and Staff
Experiments in support of the theory and design of microprocessor and micro-computer hardware and software. Use of microprocessors in control of systems. Use of simulators, cross-compilers, and development systems. Prerequisite or corequisite: ECE 165, 181. (Fall)
- 171 Computer Engineering Laboratory II (1)** Zaghloul and Staff
Class project, using a team approach in designing the subsystems needed to produce a complete digital computer system. Includes experience in software development, techniques for buses and local area networks, and design of I/O and memory subsystems. Prerequisite or corequisite: ECE 170, 182. (Spring)
- 172 Control Systems Design (3)** Carroll and Staff
Mathematical models of linear systems; steady-state and transient analyses; root locus and frequency response methods; synthesis of linear feedback control systems. Prerequisite: ApSc 114, ECE 12 or MAE 134. (Fall)
- 176 Control Systems Laboratory (1)** Carroll and Staff
Experiments in support of control theory, involving the use of the digital computer for process control in real time. Design of feedback and compensation with computer implementation. Digital simulation of linear and nonlinear systems. Prerequisite or corequisite: ECE 67, 172 or equivalent. (Fall)
- 177 Electrical Energy Conversion (3)** Harrington and Staff
Fundamentals of electromechanical energy conversion. Three-phase and single-phase AC rotating machines and transformers. DC machines, rotating machines as circuit elements. Prerequisite: ECE 12, 31. (Fall)
- 178 Electrical Power Systems (3)** Harrington and Staff
Introduction to electrical power systems; transmission and distribution of electrical power, three-phase circuits, symmetrical components, fault analysis. Voltage, current, and power limitations. Analysis of lightning and switching surges in power systems. Protective devices—switchgear, arresters, and isolators. May be taken for graduate credit. (Spring)
- 181 Computer Organization (3)** Alexandridis
Structure and operation of a digital computer. Design of computer arithmetic units, data and instruction paths. Microprogramming; memory technology; virtual memory; caches; pipelined computer organization; characteristics of secondary storage; I/O interfacing. Prerequisite: ECE 162; corequisite: ECE 161. (Spring)
- 182 Computer Architecture and Design (3)** Alexandridis and Staff
Design of bus-based digital computer systems, memory subsystems, caches, and multiple processors. Comparison of RISC and CISC processors and standard buses. Bus transfer and control signals. Performance, memory management, architectural support for protection, task switching, exception handling, instruction pipelines. Prerequisite: ECE 181. (Fall)
- 184 Introduction to Biomedical Engineering (3)** Loew and Staff
Terminology of the medical profession; physiology of the human body, from overall systems or functional approach; survey of present-day medical measurements and consideration of those areas in which engineering may be applied advantageously to medicine. May be taken for graduate credit by students in fields other than medical engineering. (Fall)
- 186 Biomedical Engineering Laboratory (1)** Loew and Staff
Experiments in support of instrumentation used in medicine and biology; safety considerations. Acquisition and measurement of physiological signals, EKG, EEG, evoked potentials. Processing of signals derived from physiological measurements. Concepts in telemetry of medical signals. Prerequisite or corequisite: ECE 30, 184. (Fall)

- 188 Introduction to Parallel and Distributed Computer Systems (3)** Alexandridis
Shared and distributed memory computer systems. Parallel computation. Interprocess communication and synchronization. Terminal, file transfer, and message handling protocols. Algorithms for deadlock detection, concurrency control, and synchronization in distributed systems. Network security and privacy. Resource control and management. Prerequisite: ECE 181. (Spring)
- 192 Robotic Systems (3)** Carroll and Staff
Modeling and analysis of robot designs. Kinematics of mechanical linkages, structures, actuators, transmissions, and sensors. Design of robot control systems, computer programming, and vision systems. Use of artificial intelligence. Current industrial applications and limitations of robotic systems. Same as MAE 197. Prerequisite: computer programming, ApSc 58, ECE 172. (Spring)
- 196 Robotics Laboratory (1)** Carroll and Staff
Experiments illustrating basic principles and programming of robots and other automated machinery. Design and writing of computer programs to use a robot's arm, vision, and data files to accomplish tasks. Prerequisite or corequisite: ECE 192/MAE 197. (Spring)
- 197 Special Topics (1 to 3)** Staff
Topic to be announced in the *Schedule of Classes*. (Fall and spring)
- 198 Research (1 to 3)** Staff
Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

ELECTRONIC MEDIA

See **Media and Public Affairs**.

EMERGENCY HEALTH SERVICES

The Bachelor of Science in Health Sciences in the field of emergency health services is described briefly under the School of Medicine and Health Sciences in this Bulletin. Complete information is available from the School of Medicine and Health Sciences.

ENGINEERING MANAGEMENT AND SYSTEMS ENGINEERING

Professors N.D. Singpurwalla, J.E. Falk, R.M. Soland, R.C. Waters, E.L. Murphree, Jr., H. Eisner, G.R. Brier, J.R. Harrauld, S. Sarkani, G. Frieder, T.A. Mazzuchi (*Chair*), J.P. Deason

Associate Professors M.R. Duffey, M.A. Stankosky, H. Abeledo, J.A. Barbera

Assistant Professors J.R. van Dorp, T. Jefferson, J.C. Ryan, M.P. Hamner

Adjunct Professors R.R. Romano, A.J. Murray, G.M. Gerson

Professorial Lecturers W.A. Goetz, S.F. Pauls, H.S. Kimmel, R.W. Kopka, N. Gerstanzang, A. Procko, R.M. Andersen, S.M. Wander, F.R. Power, W.P. Henderson, F.H. Stoodley, F. Allario, C.R. Cothorn, R.S. Cutler, D.J. Ryan, L.W. Transeau, C.H. Voas, N.J. Kirkendall, D.A. Samuelson, J.E. Collins, M.G. Goode, D.R. Skeen

Associate Professorial Lecturers R.D. Hoffer, B.A. Brower, P.A. Massimini, P.G. Meikle, B.L. Lewis, S.V. Massimini, A. Green, D.M. Chadwick

See the School of Engineering and Applied Science for the programs of study leading to the Bachelor of Science (Systems Engineering) and Bachelor of Arts (Applied Science and Technology).

- 101 Survey of Operations Research: Deterministic Models (3)** Abeledo and Staff
Basic concepts and techniques of deterministic operations research modeling as applied to problems in industrial and governmental decision making. Linear, integer, nonlinear, and dynamic programming; networks; game theory. Prerequisite: Math 32. (Fall)
- 102 Survey of Operations Research: Stochastic Models (3)** Soland and Staff
Basic concepts and techniques of stochastic operations research modeling as applied to problems in industrial and governmental decision making. Markov chains, queuing, inventory, forecasting, reliability analysis, regression analysis, and simulation. Prerequisite: ApSc 115, Math 32. (Spring)

- 109 Mathematics in Operations Research (3)** Abeledo and Staff
Mathematical foundations of optimization theory: linear algebra, advanced calculus, real analysis. Geometrical interpretations. Numerical methods and use of software. Applications to modeling techniques in operations research. Prerequisite: Math 33. (Fall)
- 135 Systems Thinking and Policy Modeling I (3)** Mazzuchi and Staff
Stock-flow analysis of feedback systems presented for policy analysis and management. System dynamics; principles of systems employed to structure the problem-solving process. Problems and case studies solved using micro-computers. (Fall)
- 154 Applied Optimization Modeling (3)** Falk and Staff
Analysis of optimization models, including areas of nutrition, water pollution, energy, reliability, inventory control, game theory, chemical equilibrium, portfolio selection, and parameter estimation. Solution of models via the GAMS modeling software. Prerequisite: Math 33. (Fall)
- 160 Survey of Finance and Engineering Economics (3)** Duffey and Staff
Survey of material relevant to financial decision-making for engineering activity. Includes traditional engineering economy topics; fundamentals of accounting; and financial planning, budgeting, and estimating applicable to the management of technical organizations. Same as Econ 160. (Fall, spring, and summer)
- 171 Data Analysis for Engineers and Scientists (3)** Singpurwalla and Staff
Design of experiments and data collection. Regression, correlation, and prediction. Time series models: autoregression, moving averages, and exponential smoothing. Neural nets. Data filtering and dynamic modeling. Data pooling, data compression, information fusion, and data mining. Model validation. Prerequisite: ApSc 115. (Fall)
- 173 Discrete Systems Simulation (3)** Frieder and Staff
Simulation of discrete stochastic models. Simulation languages. Random-number/random-variate generation. Statistical design and analysis of experiments, terminating/nonterminating simulations; comparison of system designs. Determination of input distributions. Variance reduction. Validation of models. Prerequisite: ApSc 116, CSci 51, or permission of instructor. Same as Stat 173. (Spring)
- 182 Quality Control and Acceptance Sampling (3)** Mazzuchi and Staff
Mathematical and statistical approaches to quality assurance. Control charts, acceptance sampling by attributes and variables, outgoing quality levels, cost of quality, relationship between reliability and quality, Bayesian techniques and time-series methods. Prerequisite: ApSc 115 or permission of instructor. (Spring)
- 191 Systems Engineering Senior Project (3)** Soland and Staff
Field experience in systems engineering on a team basis. Each small group confronts an actual problem and formulates a solution using systems engineering methods and models. Oral and written reports. Prerequisite or corequisite: EMSE 154, 171, 173, 182. (Spring)

ENGLISH

Professors R.N. Ganz, Jr., J.H. Maddox, G. Paster, J.A.A. Plotz, C.W. Sten, D. McAleavey, O.A. Seavey, L.B. Salamon, A. Romines, J.A. Miller, J. Shore
Associate Professors G.R. Bozzini, R.L. Combs, G. Carter, K. Moreland, D. Moshenberg, M. Alcorn, M.S. Soltan, F. Moskowitz (Chair), T.G. Wallace, M.D. Clair, J.M. Green-Lewis, J.J. Cohen, P. Cook, P. Chu, G. Wald, V. Chandra, P. Griffith
Assistant Professors E. Schreiber, J. Harris, A. Hewett, R. McRuer, C. Betensky, C. Gamber, P.M. Ryder, A. Schultheis, M. Mullen, L.M. Belau, C.A. Leenerts, A.B. Levine, K. Daiya, J.C. James, M.D. Jones, S. Lovelady, C. Hayes (Visiting), S.P. Willens
Adjunct Associate Professor J. Bolz
Adjunct Assistant Professors D. Scarboro, S. Maley, A. Wilkerson, S. Haedicke
Adjunct Instructors D.A. Bruno, S. Gold, P. Presser
Jenny McKean Moore Writer in Washington J. McNally

Bachelor of Arts with a major in English—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.

2. Prerequisite courses—Engl 51–52 or 61–62 or 71–72 or 73–74 or 91–92; or Hmn 1, 2; or Honr 15–16.

3. Required courses in related areas—foreign language: intermediate proficiency in a single foreign language, as demonstrated by completion of two years of college-level language study or the equivalent. (In the case of Latin, Latin 3 is sufficient.)

4. Required for the major—33 credit hours of 100-level English courses, including the following:

- a) 9 hours in literature before 1800 (Engl 112, 113, 125, 127–28, 130, 131–32, 153, 155, 160)
- b) Engl 120 and 3 additional hours in literary theory and/or cultural studies (Engl 124, 137, 138, 175, 179, 195, 196)
- c) 3 hours in minority or post-colonial literature and tradition (Engl 139–40, 169, 173, 174, 179, 187, 188)
- d) 3 hours in 19th-century literature (Engl 133, 135–36, 154, 161, 162, 163, 167)
- e) 3 hours in 20th-century literature (Engl 137–38, 139–40, 157–58, 164, 165–66, 168, 170, 177–78)

With departmental approval, courses with appropriate subject matter may be substituted for those specified above.

Students take 9 additional hours of 100-level English courses, which may be in creative writing or composition. With approval of the English Department, 6 hours in the literature of a foreign language (either in the original language or in translation) may be substituted for English electives.

Special Honors—Majors in English who wish to be considered for Special Honors must meet the requirements listed under University Regulations: have maintained a 3.0 grade-point average; and apply for admission to the program, in writing, by October 15 of the junior year. Once admitted, the candidate must enroll in Engl 195 in the spring semester and in Engl 196 in the following fall semester. During the junior year, candidates must continue to maintain a 3.0 overall grade-point average and a 3.25 average in courses in the English Department. Subject to departmental approval, the candidate enrolls in Engl 198 in the spring semester of the senior year. To be eligible for graduation with Special Honors, candidates must earn an A on the Honors Thesis and have achieved a 3.4 grade-point average in courses in the English Department.

Bachelor of Arts with a major in English and creative writing—Except for the requirement of a creative thesis, this major closely resembles the curriculum that is followed by an English major pursuing a creative writing minor. Admission to the major is restricted, and a separate application must be filed in writing prior to the senior year. No more than two students per thesis director are accepted per year.

The major in English and creative writing requires 39 credit hours of 100-level English courses, matching items 1 through 4(e) indicated under the Bachelor of Arts with a major in English, with the additional requirements of Engl 81 as a prerequisite and 15 hours of 100-level creative writing courses, including 9 hours in the writing of either poetry or fiction and Engl 194.

Bachelor of Arts with a major in dramatic literature—The Department of Theatre and Dance and the Department of English offer an interdisciplinary major in dramatic literature. See Dramatic Literature.

Minor in English—6 hours of introductory literature courses and 15 hours of 100-level literature courses, chosen in consultation with an advisor in the department.

Minor in creative writing—Engl 81, 6 hours of introductory literature (e.g., Engl 51–52), and 15 hours of 100-level courses offered by the department, of which at least 12 must be in creative writing, including at least 9 hours in poetry (Engl 104, 107, and 117 or 181) or 9 hours in fiction (Engl 103, 106, and 116 or 181) or 6 hours in playwriting (Engl 105, 108).

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Departmental prerequisite: Engl 9 or 10 is prerequisite to all other courses in English. Engl 9 or 10 is waived by a score of 710 or above on the SAT II Writing subject test or 28 or above on the English component of the ACT testing battery. A 3-credit-hour literature survey, such as Engl 51 through 92, is prerequisite to all 100-level English courses with the exception of Engl 102, 110, 160, 161, and 162.

The admission of international students to any English composition course is determined by the EFL Placement Test. Students should apply to the Department of English

as a Foreign Language to take this test (see Students from Foreign Institutions, under Admissions).

EXPOSITORY WRITING

- 9 English Composition: Language as Communication (3)** Moshenberg and Staff
Parallels content of Engl 10; offers more intensive work on analytical and critical reading, fluency, and control over the writing process. Smaller class size and five hours per week afford more attention to each student. (Fall)
- 10 English Composition: Language as Communication (3)** Moshenberg and Staff
Critical examination of the ways of language and of writers; active analysis of language as discursive and as cultural, with special attention paid to the prose essay. Emphasis on the writing process, with guidance in revising towards clear, persuasive, and engaging prose. Thematically organized content-based seminars; texts and course topics vary among sections. (Fall and spring)
- 11 English Composition: Language and the Arts and Sciences (3)** Moshenberg and Staff
Critical examination of language and discourse in the diverse, disciplinary communities of the university. Focuses on the extended, documented, independently conceived research essay and project. Thematically organized content-based seminars; texts and course topics vary among sections. (Fall and spring)
- 14-15 English Composition: Women, Writing, and Power (3-3)** Staff
To be taken only in conjunction with the Women and Leadership Program on the Mount Vernon Campus.
- 100 Intermediate Expository Writing (3)** Staff
Concentration on perfecting the skills of addressing a variety of audiences, focusing and organizing the essay, varying tone and method of discourse, and using appropriate vocabulary in several subjects. Texts and topics vary. Prerequisite: Engl 11 or equivalent. Class size limited to 15 students.
- 101 Advanced Writing (3)** Staff
Individualized instruction and frequent conferences; writing projects vary with each student according to needs and interests. Emphasis on developing professional work habits. Prerequisite: Engl 11 or 13, or written permission of instructor. Class size limited to 15 students. (Fall and spring)
- 102 Written Communications in Accounting (3)** Staff
Analysis of communications by accountants and managers; frequent writing assignments, with emphasis on effective form and language in memoranda, letters, reports. Major in accountancy not required. Prerequisite: Engl 11 and junior status. Class size limited to 15 students. (Fall and spring)
- 111 Preparation for Peer Tutors in Writing (3)** Schreiber
For undergraduates accepted as tutors in the Writing Center: study and practice of techniques for prewriting, writing, and revision; readings on collaborative learning, the composing process, composition theory, cognitive psychology, critical thinking, and the teaching of writing; observation and exercises in writing, peer review, and tutoring. (Fall)

CREATIVE WRITING

- 81 Introduction to Creative Writing (3)** McAleavey and Staff
An exploration of genres of creative writing (fiction, poetry, and/or playwriting). Basic problems and techniques; examples of modern approaches; weekly writing assignments; workshop and/or conference discussion of student writing. Prerequisite: Engl 11. Limited to 15 students. (Fall and spring)
- 103 Intermediate Fiction I (3)** Moskowitz, Clair, Chandra
The writing of fiction. Prerequisite: Engl 81 or equivalent and a two-semester literature survey. Limited to 15 students. (Fall and spring)
- 104 Intermediate Poetry I (3)** McAleavey, Clair, Bolz, Shore
The writing of poetry. Prerequisite: Engl 81 or equivalent and a two-semester literature survey. Limited to 15 students. (Fall)
- 105 Fundamentals of Dramatic Writing (3)** P. Griffith
Same as TrDa 105. A workshop in playwriting and screenwriting, with emphasis on dramatic structure. Prerequisite: Engl 81 or equivalent and a two-semester literature survey. Limited to 15 students. (Fall)

- 106 **Intermediate Fiction II (3)** Moskowitz, Clair, Chandra
The writing of fiction. Prerequisite: Engl 103 or equivalent. Limited to 15 students. (Spring)
- 107 **Intermediate Poetry II (3)** McAleavey, Bolz, Clair, Shore
The writing of poetry. Prerequisite: Engl 104 or equivalent. Limited to 15 students. (Spring)
- 108 **Intermediate Dramatic Writing (3)** P. Griffith
Same as TrDa 108. A workshop developing scripts for both theatre and film. Prerequisite: Engl 105 or equivalent. Limited to 15 students. May be repeated for credit with departmental approval. (Spring)
- 116 **Advanced Fiction (3)** Moskowitz, Clair, Chandra
Further workshop study of the writing of fiction. Prerequisite: Engl 106 or equivalent. Limited to 15 students. May be repeated for credit with departmental approval.
- 117 **Advanced Poetry (3)** McAleavey, Shore, Bolz
Further workshop study of the writing of poetry. Prerequisite: Engl 107 or equivalent. Limited to 15 students. May be repeated for credit with departmental approval.
- 181 **Creative Writing Workshop (3)**
Taught by the Jenny McKean Moore Writer in Washington; open to undergraduates and graduate students. Prerequisite: a 100-level creative writing course. May be repeated for credit, if taught by a different instructor. Limited to 15 students. (Fall and spring)
- 182 **Special Topics in Creative Writing** Chandra, Clair, McAleavey, Moskowitz, Shore, Griffith
Topics announced in the *Schedule of Classes*; may be repeated for credit provided the topic differs. Topics of projected courses include poetry and poetics; forms and methods in fiction; forms and methods in poetry; memoir and personal narratives; creative nonfiction; "Literature, Live!"; avant-garde and experimental writing.
- 194 **Creative Writing Senior Thesis (3)** Chandra, Clair, McAleavey, Moskowitz, Shore, Griffith
Under the guidance of an instructor, the student composes an original manuscript of poetry or short fiction. Open only to seniors admitted to the English and creative writing major. (Fall and spring)

ENGLISH AND AMERICAN LITERATURE

- 51-52 **Introduction to English Literature (3-3)** Plotz, Salamon, and Staff
Representative works by major authors studied in their historical context; discussion of recurrent themes and introduction to various types and forms of imaginative literature. Engl 51: Middle Ages through the 18th century. Engl 52: 19th and 20th centuries. (Academic year)
- 61 **Tragedy (3)** Carter
Modes of tragedy as developed in drama, nondramatic verse, and prose fiction in literature from ancient to modern times—Book of Job to Beckett.
- 62 **Comedy (3)** Staff
Modes of comedy as developed in drama, nondramatic verse, and prose fiction—Chaucer to Borges.
- 71-72 **Introduction to American Literature (3-3)** Sten, Combs, and Staff
Historical survey. Engl 71: From early American writing through Melville, Whitman, and Dickinson. Engl 72: From Twain, James, and Crane to the present. (Academic year)
- 73-74 **Literature of Black America (3-3)** Miller, Wald, James, Jones, and Staff
Survey of the major periods and principal authors of the African American tradition. Engl 73: 1789-1900. Engl 74: 20th century. (Academic year)
- 91-92 **Survey of Postcolonial Literature (3-3)** Plotz and Staff
Introduction to postcolonial literature from the perspectives of colonizer and colonized in Great Britain, India, Pakistan, Bangladesh, Sri Lanka, Australia, New Zealand, Canada, Anglophone Africa, and the Caribbean region; literature written on the wing, in diaspora. (Academic year)
- 112 **Chaucer (3)** Cohen
Chaucer's major works seen as exciting, lively texts from the modern perspective and as products of specific economic, social, and cultural trends of the late

14th century. Focus on *The Canterbury Tales*, read in the original Middle English. (Fall)

113 Medieval Literature (3)

Cohen

Readings from a wide range of medieval genres, including romances, saints' legends, mystical narratives, lyrics, civic drama, and social satires, to explore some of the principal concerns of medieval culture. How these texts responded to and shaped changing patterns of medieval culture, as the clergy, the aristocracy, and the urban bourgeoisie attempted to define a culture of their own.

120 Critical Methods (3)

Alcorn, Carter

The topics and techniques of literary analysis, applied to English and American poetry, prose fiction, and drama. Attention to stylistic and structural analysis, narratology, and critical theory applied to specific literary texts. (Fall and spring)

124 Play Analysis (3)

Staff

Same as TrDa 124. Examines both traditional and nontraditional (Aristotelian and non-Aristotelian) approaches to the analysis of dramatic literature and explores literary and theatrical techniques used by playwrights. (Spring, odd years)

125 The English Renaissance (3)

Salamon

Verse and prose written in the period 1515–1625, examined in relation to continental culture and to the social institutions that shaped English culture. More, Sidney, Spenser, Shakespeare, Donne, Jonson, Bacon, Herbert considered in relation to Petrarch, Castiglione, Aristo, Erasmus, Montaigne, Labé, Descartes.

127–28 Shakespeare (3–3)

Paster, Salamon

Close study of six or seven plays each semester, with emphasis on the texts in history and ideology. Survey of current critical practices (feminist, materialist, psychoanalytic) and examination of Shakespeare as a cultural institution. (Academic year)

129 Topics in Shakespeare Studies (3)

Paster, Salamon, Cook, Cohen, Wallace

Critical study of a particular aspect of Shakespeare's work, or of a distinctive approach to the plays. Projected topics: Shakespeare on film, the history plays and Elizabethan England, 18th century rewritings of Shakespeare, Shakespeare as poet, cultural materialist readings of Shakespeare.

130 Milton (3)

Cook

Study of the major works in verse and prose, following the course of Milton's career. (Spring)

131–32 The 18th Century: Literature and Authority (3–3)

Wallace

Readings in significant 18th-century English writers—Dryden, Swift, Pope, Johnson, and others—with emphasis on tracing the ways in which literary texts contain, perpetuate, and subvert social and political ideologies.

133 The Romantic Movement (3)

Plotz, Combs

Major figures and topics in English and Continental romanticism: Blake, Wordsworth, Coleridge, Lamb, Byron, Shelley, Keats, Hazlitt, DeQuincey, and others.

135–36 Victorian Literature (3–3)

Carter

Engl 135: 1830–1865—E. Brontë, Dickens, Tennyson, Browning, Arnold; Darwin, Carlyle, Ruskin. Engl 136: 1865–1900—Eliot, Hardy, Conrad; Swinburne, the Rossettis, Morris; Pater, Wilde, the Nineties.

137 Modernism (3)

Soltan, Green-Lewis

The emergence of modernist experimentation (and the sense of epistemological and moral crisis it expressed) in the poetry and prose of Pound, T.S. Eliot, Woolf, Kafka, and others. The reaction against modernist styles and themes in the wake of World War II, as seen in the work of Auden, Waugh, Wyndham Lewis, Faulkner, Barnes, Lessing.

139–40 20th-Century Irish Literature (3–3)

Maddox

Irish writers from the time of the Literary Revival in the late 19th century to the present. Engl 139: Yeats and other Irish poets and playwrights of his time and after—Synge, O'Casey, Kavanagh, Heaney, and others. Engl 140: Joyce through *Ulysses* and other fiction writers of later generations—O'Brien, Beckett, and others. (Academic year)

153–54 The English Novel (3–3)

Wallace, Maddox, Soltan

Engl 153: The 18th century—Defoe, Richardson, Fielding, Sterne, and others. Engl 154: The 19th century—Austen, the Brontës, Dickens, George Eliot, Hardy, and others. (Academic year)

- 155-56 **The English Drama (3-3)** Cook, Paster
Engl 155: Shakespeare's contemporaries. Engl 156: Historical survey, 1660 to present.
- 157 **Modern Drama (3)** Paster
Representative continental, English, and American plays of the period 1900-1960.
- 158 **Contemporary Drama (3)** Staff
Examines drama written since 1960 in the light of postmodernism as both a literary and a theatrical theory. Explores the ways contemporary playwrights and directors challenge the perceptions and assumptions of today's audience.
- 160 **Early American Literature and Culture (3)** Seavey
The shaping of America's early literary and cultural traditions as shown by significant writers of the colonial and early national periods: Bradstreet, Cotton Mather, Edwards, Franklin, Crèvecoeur, and others. (Fall)
- 161 **American Romanticism (3)** Sten
The shaping of America's literary and cultural traditions as shown by significant writers of the Romantic era: Poe, Emerson, Hawthorne, Melville, Thoreau, Whitman, Dickinson, and others. (Spring)
- 162 **American Realism (3)** Romines
The shaping of America's literary and cultural traditions as shown by significant writers of the Realist school: Twain, James, Crane, Howells, Wharton, Chopin, Robinson, and others. (Fall)
- 163-64 **American Poetry (3-3)** Ganz, Combs, McAleavey
Close examination of major American poems. Engl 163: From the beginnings to the early 20th century: works by Poe, Emerson, Whitman, Dickinson, and others. Engl 164: Since the early 20th century: Frost, Eliot, Stevens, Bishop, Hughes, Ashbery, and others.
- 165-66 **American Drama (3-3)** Combs
Engl 165: 19th-century melodrama and the emergence of realism; works by O'Neill and other dramatists of the early 20th century. Engl 166: Developments in modern American drama since World War II, including works by Williams, Miller, Albee, Shepard, Rabe, Guare, Mamet, Henley, Wasserstein, Shange, Hwang, Wilson, and others.
- 167-68 **The American Novel (3-3)** Maddox, Seavey, Moreland, Sten
Historical and critical study of major works in the American novelistic tradition. Engl 167: From the beginnings through the 19th century: Hawthorne, Melville, James, Twain, Dreiser, and others. Engl 168: The 20th century: Wharton, Cather, Anderson, Hemingway, Fitzgerald, Faulkner, Wright, R.P. Warren, Nabokov, and others. (Academic year)
- 169 **Ethnicity and Place in American Literature (3)** Chu, Romines, Miller
The relationships among ethnic identity, authorship, regional setting, and national consciousness. Differences in the literary culture of ethnically, racially, and regionally diverse American populations; how considerations of ethnicity and place have been reshaping the American literary canon. Texts and emphases vary with instructor.
- 170 **The Short Story (3)** Combs
An extensive survey of short fiction by a wide variety of writers of the 19th and 20th centuries, about half of them American; readings on the art of the short story by writers and literary critics.
- 171 **Major Authors (3)** Staff
In-depth studies of a single figure or two or three authors (of British, American, or other nationality) who have written in English. Topics announced in the *Schedule of Classes*; may be repeated for credit provided the topic differs.
- 172 **Selected Topics in Literature (3)** Staff
Topics announced in the *Schedule of Classes*; may be repeated for credit provided the topic differs. Topics of projected courses include the Bloomsbury group; children's literature; southern literature; early modern literature; the picaresque; literature of the Holocaust; literature and politics; Freud, Dostoevsky, and Shakespeare.
- 173 **Selected Topics in Post-Colonial Literature (3)** Plotz, Daiya
Historical, critical, and theoretical study of post-colonial literatures—African, Asian, Commonwealth—in English. Topics vary with instructor; may be repeated for credit provided the topic differs.

- 174 African American Literature (3)** Wald, Miller, James, Jones
Study of texts representing the experiences of black Americans and the ideas and social forces that have shaped their lives and writings.
- 175 Gender and Literature (3)** Romines, Wald
Symbolic representations of culturally defined roles and assumptions in literature. Male and female gender roles as fundamental to culture; the representation of culture, in literature especially and in the arts and humanities generally.
- 177-78 Contemporary American Literature (3-3)** Moskowitz, Ganz, Chu
Major and representative works, 1946-1980. Engl 177: poetry, fiction, and non-fiction by Flannery O'Connor, Ginsberg, Kerouac, Rich, Lowell, Plath, Mailer, Roethke, Baraka, Berryman, Ashbery, and others. Engl 178: essay, short story, and novel: Warren, Salinger, Agee, White, Cheever, Nabokov, Welty, Wilder, Olsen, Bellow, McPhee, and others.
- 179 Special Topics in Literary Theory and/or Cultural Studies (3)** Staff
Selected topics in the diverse theoretical methodologies and interdisciplinary studies that characterize contemporary English and American literary studies. May be repeated for credit provided that topic differs.
- 187 Asian American Literature (3)** Chu
The rapidly expanding tradition of literature written by and about Americans of Asian descent. The intersection of Asian-American histories and the developing literary tradition; representation of identity, ethnicity, gender; "orientalism."
- 188 Jewish American Writing (3)** Plotz, Willens
One hundred years of Jewish American writing in fiction, autobiography, poetry, drama, and non-fictional prose. The immigrant experience, American philo-Semitism and anti-Semitism, the Holocaust and after, the New York intellectuals, Jewish feminism, and the patriarchal tradition.
- 195-96 Honors Seminar (3-3)** Green-Lewis, Soltan, Wallace
Genre and genre theory; literature as cultural artifact and as instrument of cultural criticism; various critical approaches—ideological, historical, and ahistorical. Open only to second-semester junior and first-semester senior honors candidates in English. (Engl 195: spring; Engl 196: fall)
- 197 Independent Study (3)** Moskowitz and Staff
For exceptional students, typically majors, whose academic objectives are not accommodated in regular courses. Students must obtain the chair's approval and arrange for supervision by an appropriate member of the department. (Fall and spring)
- 198 Honors Thesis (3)** Staff
Under the guidance of an instructor, the student writes a thesis on an approved topic. Open only to senior honors candidates in English. (Fall and spring)
- 199 Internship: Research and Writing (3)** McAleavey and Staff
Position of responsibility with a publication or an educational or cultural institution or other organization offering practical experience in research and writing. Restricted to junior and senior English majors; requires departmental approval of plans prior to registration. Regular meetings with supervising professor.

ENGLISH AS A FOREIGN LANGUAGE

Associate Professors C.F. Meloni, B.P. Tyndall, J.K. Donaldson, Jr.

Assistant Professors F.C. Reid, M. Kirkland, S. Thompson, A.J. Belev, P. Connerton, C.L. Iacobelli, P.N. Edmondson, R.W. Tucker, C. Matthews (*Chair*), D.L. Weasenforth

Assistant Professorial Lecturer E.K. Wilairat

This comprehensive program in English as a foreign language is designed for those enrolled or planning to enroll in University degree programs, for members of Washington's international community, and for other individuals who wish to improve their command of English through an intensive or semi-intensive study program. International students entering the program must take the EFL Placement Test before registering for any EFL course.

Note: Students admitted through EFL may take only EFL courses. The following course restrictions pertain to students admitted to degree programs who are enrolled in EFL courses. Students in EFL 2 and 3 may not take other courses. Most degree programs do not permit students in EFL 4 to take other courses; exceptions require approval of the chair or dean. Students in EFL 5 and 49 may take one or two other courses.

In special cases and with the approval of the department, component parts of EFL 2, 3, and 4 can be taken separately. Tuition rates and laboratory fees are charged accordingly.

- 2 **Intensive Lower-Intermediate English (0)** Staff
Introduction to reading strategies, vocabulary development, conversation skills, and writing fluency. Study of basic grammar. Twenty class hours per week. Students registered for EFL 2 will not be permitted to register for any other academic course. Tuition is charged at the rate of 7 credit hours; laboratory fee, \$70.
- 3 **Intensive Intermediate English (0)** Staff
Emphasis on reading strategies, vocabulary development, composition, group discussions, individual presentations, and guided note-taking. Continued study of grammar. Twenty class hours per week. Students registered in EFL 3 will not be permitted to register for any other academic course. Tuition is charged at the rate of 7 credit hours; laboratory fee, \$50.
- 4 **Intensive Higher-Intermediate English (0)** Staff
Introduction to academic skills: reading strategies for university-level materials, study strategies, reading-based writing, lecture and note-taking, group discussions and presentations. Selected grammar instruction. Twenty class hours per week. No additional academic courses allowed without approval of the advisor. Tuition is charged at the rate of 7 credit hours; laboratory fee, \$50.
- 5 **Introduction to Academic Writing for Undergraduates (0)** Staff
Introduction to the research/writing process. Continued practice in reading university-level materials and reading-based writing. Focus on revision and editing. Eight class hours per week. Tuition is charged at the rate of 4 credit hours.
- 10 **English Composition for International Students (3)** Staff
Expository writing and advanced research course for undergraduates who demonstrate high proficiency in English. Oral presentation on research. Four class hours per week. Prerequisite: EFL 5 or placement in EFL 10. Course can be taken by international students in lieu of Engl 9 or 10. Special fee, \$25.
- 46 **EFL Tutorial (0)** Connerton
Individualized instruction in specific skill areas. Departmental approval required. Tuition is charged at the rate of 1, 2, or 3 credit hours, depending on the number of hours of instruction.
- 49 **Academic Research and Writing for Graduate Students I (0)** Staff
Introduction to the research/writing process. Continued practice in reading university-level materials and reading-based writing. Focus on revision and editing. Oral presentations based on written texts. Eight class hours per week. Tuition is charged at the rate of 4 credit hours.
- 51 **Independent Study (1 to 3)** Connerton
Individualized instruction in specific skill areas for students who demonstrate high proficiency in English (EFL 10 or 59 or higher). Departmental approval required. Tuition is charged at the rate of 1, 2, or 3 credit hours, depending on the number of hours of instruction.
- 59 **Academic Research and Writing for Graduate Students II (3)** Staff
Academic writing and advanced research course for students who demonstrate high proficiency in English. Small group work and oral presentations on research. Four class hours per week.
- 60 **Advanced Oral Communication (3)** Staff
For students who demonstrate high proficiency in English and wish to improve their formal oral communication skills. Emphasis on preparing and delivering informative and persuasive speeches, and on leading and participating in small-group discussions. Four class hours per week. Prerequisite: EFL 4 or placement in EFL 5 or 49. Special fee, \$25.
- 61 **American Language and Culture (3)** Beley
For students who demonstrate high proficiency in English and wish to improve their academic and critical thinking skills. Examination of a variety of themes prevalent in American culture. Emphasis on sharpening academic skills: analytical reading, writing from sources, class discussion, and oral presentations. Four class hours per week. Prerequisite: EFL 4 or placement in EFL 5 or 49. Special fee, \$25. (Spring)
- 62 **America on Film (3)** Donaldson, Iacobelli
For students who demonstrate high proficiency in English and wish to improve their aural/oral communication skills. Emphasis on aural comprehension and

interaction skills through viewing and discussion of films. Selected themes in American culture are traced through a variety of film genres. Four class hours per week. Prerequisite: EFL 4 or placement in EFL 5 or 49. Special fee, \$25. (Fall)

70 American English Pronunciation (1 or 2)

Thompson

For students who demonstrate high proficiency in English and wish to understand spoken English better and to make themselves more easily understood. Emphasis on pronunciation, stress, rhythm, intonation, and comprehension skills in American English. Individualized help both in class and in weekly one-on-one sessions with instructor.

ENVIRONMENTAL STUDIES

See *Earth and Environmental Sciences*.

EXERCISE SCIENCE

Programs in exercise science are available through the Department of Prevention and Community Health in the School of Public Health and Health Services. The following courses are available to undergraduates in other schools and may be used toward a secondary field in exercise science.

Listings of exercise and sport activity courses are contained in the *Schedule of Classes*. Credit for exercise and sport activities courses is not generally recognized for the baccalaureate. The University is not responsible for injuries received in any of the activities of these courses and the student assumes full responsibility therefor.

50 Emergency Procedures and Safety Skills (2)

Training for certification in cardiopulmonary resuscitation and first aid. Laboratory fee, \$13. (Fall and spring)

102 Introduction to Athletic Training (3)

Designed to introduce students to profession of athletic training. Exploration of topics related to athletic training and sports medicine. This course is required for Athletic Training Certification. (Spring)

103 Professional Foundations in Exercise and Sport Science (3)

Nature, scope, and scientific basis of exercise and sport science; orientation to professional competencies and opportunities. (Fall)

107 Personal Health and Wellness (3)

A survey of the various components involved in personal health and wellness, such as personal fitness, sexuality, mental health, and environmental health. Emphasis is on application of knowledge through the use of decision-making and behavior modification skills. (Fall and spring)

109 Fitness Testing and Prescription (3)

Evaluation of aerobic capacity, muscular strength, flexibility, and ideal body weight; development of prescribed exercise programs. Laboratory fee, \$40.

110 Supervision and Leadership of Exercise and Sport Programs (3)

Concepts and techniques of the supervision and management of fitness programs and personnel. (Spring)

112 Organizing and Directing Sport, Health, and Fitness Activities (3)

The study of techniques for teaching, leading, organizing, and facilitating sport, health, and fitness activities in a variety of organized settings. (Spring)

122 Methods and Materials for Health Education (3)

Conceptual approaches to curriculum design and teaching, including planning and organization, methodology, selection and use of materials, and evaluation. (Spring)

125 Human Sexuality (3)

Course is designed to explore the biological and developmental aspects of human sexuality; the psychological and emotional aspects of sexual behavior; sexual identity; social forces affecting sexual issues; and research trends in the area of human sexuality. (Fall and spring)

134 Sport and Nutrition (3)

The nutrition needs for recreational exercise and sports; skills in assessing nutrition needs; development of individual nutrition programs that are sport/activity-specific; and identification and correction of nutrition problems affecting sports performance. (Fall)

- 135 Sport and the Law (3)**
Basic principles of the law as it applies to amateur and professional sports. Legal issues and their ramifications. (Spring)
- 138 Administration of Exercise and Sports Medicine Programs (3)**
Basic principles related to the administration of programs in the fitness, exercise, sport and sports medicine fields. (Fall)
- 139 Principles of Coaching (3)**
Study of coach/athlete behavioral patterns and interactions, coaching methods, and interdisciplinary principles applicable to coaching. (Spring)
- 140 Exercise and Sport Psychology (3)**
Study of psychological aspects of sport participants, athletes, teams, and competition in sport situations, including personality, motivation, performance level, achievement, and behavioral change strategies; social factors, training events, and measurement techniques. (Fall and spring)
- 145 Working, Stress, and Human Values (3)**
Recognition, prevention, and control of stress and the burnout syndrome. A humanistic inquiry into values, attitudes, and stressors associated with various professions. Admission by permission of instructor. (Fall)
- 146 Stress Management, Burnout, and Human Potential (3)**
The nature, prevention, and control of the stress and burnout syndrome. Students will design an overall stress management strategy that incorporates achievement of life goals and human potential in a stress-efficient manner. Admission by permission of instructor. (Spring)
- 151 Kinesiology (3)**
Analysis of human movement with emphasis on the biomechanics of exercise and sport movement patterns. Prerequisite: EXSC 154 or equivalent, an approved course in anatomy. (Spring)
- 152 Physiology of Exercise (3)**
The physiological functions of the body and the effect of exercise on these functions. Prerequisite: ExSc 154-55 or permission of instructor. Laboratory fee, \$40. (Spring)
- 154-55 Applied Anatomy Physiology I-II (3-3)**
Fundamentals of human anatomy and physiology for students preparing for health sciences professions. Emphasis is placed on bones, joints, muscles, innervation, and blood supply. Laboratory fee, \$40. Prerequisite to ExSc 155: ExSc 154. (Academic year)
- 156-57 Applied Anatomy and Physiology Laboratory I-II (1-1)**
Laboratory complement to ExSc 154-55. Concurrent registration: ExSc 154-55. Laboratory fee, \$40.
- 158 Prevention and Care of Athletic Injuries (3)**
Safety education, liability, prevention and care of sports injuries; related personnel, facilities, and equipment. Prerequisite: ExSc 154-155 or equivalent. Laboratory fee, \$40. (Fall)
- 159 Physical Assessment of Athletic Injuries (3)**
The course is designed to provide lectures and lab sessions dealing with upper and lower extremities for injury evaluation techniques. Prerequisite: ExSc 158. Laboratory fee, \$40. (Spring)
- 161-62 Practicum (3-3)**
For departmental majors and minors only. Practical experience in related disciplines. May be repeated for credit. (Academic year)
- 168 Therapeutic Modalities in Sports Medicine (3)**
The purpose of this course is to explain and demonstrate the use of therapeutic modalities on the healing process. This will include discussion of the use of therapeutic modalities to enhance the rehabilitation process after athletic injury. Prerequisite: ExSc 159 or permission of instructor. Laboratory fee, \$40. (Fall)
- 169 Therapeutic Exercise in Sports Medicine (3)**
The purpose of this course is to discuss and apply general rehabilitation techniques to specific athletic injuries. This will include evaluation, implementation and follow-up after specific joint injuries. Prerequisite: ExSc 159 or permission of instructor. (Spring)
- 171 Issues in Exercise and Sport Science (3)**
Study of current literature with implications for exercise and sport science specializations; use of library resources and retrieval systems; evaluation of professional competencies. Senior ExSc majors only. (Spring)

173 Independent Study (1 to 3)

For departmental majors only. Individually designed model for intensive study in an area of special interest. Prerequisite: demonstrated competency for independent work and permission of advisor and instructor. May be repeated for credit. (Fall, spring, and summer)

175 Internship (3 to 9)

For departmental majors. Admission by permission of advisor. (Fall, spring, and summer)

180 Topics in Exercise Science (1 to 3)

Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.

FILM STUDIES**Committee on Film Studies**

B. Mergen (*Chair*), D. Bell, K. Harvey, A. Hiltbentel, P. Rollberg, N. Seavey, J.-F. Thibault

Minor in film studies—Students in Columbian College of Arts and Sciences may earn a minor in film studies by completing the four core courses below plus three additional film courses chosen from AmSt 192, Chin 161, EMda 171, 173, Fren 134, Ger 181, Phil 62, Slav 185, 186, Span 133.

151 Film Theory (3)

An introduction to film theory and a survey of the philosophical and critical literature inspired by cinema. (Fall)

152 Genres of Film (3)

An exploration of the relationship between cinematic structure and narrative content in various types of film

153–54 History of World Cinema I–II (3–3)

A two-semester sequence covering 100 years of international cinematic history from an aesthetic and political point of view. (Academic year)

FINANCE

Professors T.M. Barnhill (*Chair*), W. Handorf, M.S. Klock, S. Phillips, I.L. Glascock

Associate Professors J.M. Sachlis, N.G. Cohen, P.S. Peyser, G.M. Jabbour, I.G. Bajeux-Besnainou, M. Eppli, A.J. Wilson, P.R. Locke

Assistant Professors R. Savickas, K.L. Neuhauser

Professorial Lecturer S. Uvanik

Associate Professorial Lecturer R. Strand

See the School of Business and Public Management for programs of study leading to the degrees of Bachelor of Accountancy and Bachelor of Business Administration.

Departmental prerequisite: BAdm 115 is prerequisite to all courses in the Finance Department.

122 Intermediate Finance (3)

Staff

Theory and practice of acquiring and using funds. Simulations of business decisions by cases and/or models to assess the risk/return interaction of investment, financing, and dividend decisions. (Fall and spring)

123 Investment and Portfolio Management (3)

Staff

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. (Fall and spring)

124 Advanced Financial Management (3)

Staff

Analysis and readings covering applications of theory to financial management. Case studies for decision making involving working capital, capital budgeting, financing, dividend policy, and valuation. Prerequisite: Fina 122, 123. (Fall and spring)

132 Real Estate Investment (3)

Handorf, Eppli

Principles of real estate investment, including valuation, appraisal, financing, and development, in addition to a discussion of the mortgage market and its institutions. (Fall)

135 Money and Capital Markets (3)

Staff

The process of capital formation in a free enterprise economy, with special emphasis on factors affecting the level and structure of interest rates. Money mar-

ket, capital market, and derivative contracts (futures and swaps) are evaluated from both investment and financing perspectives. (Fall and spring)

190 Special Topics (3)

Staff

Experimental offering; new course topics and teaching methods.

199 Independent Study (arr.)

Assigned topics. Admission by prior permission of advisor. May be repeated once for credit. (Fall and spring)

FINE ARTS AND ART HISTORY

Professors L.F. Robinson J.F. Wright, Jr., J.L. Lake, T. Ozdogan, M.P. Lader, C.C. Costigan, J.C. Anderson, W.T. Woodward, B. von Barghahn, H.I. Gates, S.B. Molina, D. Bjelajac (Chair), N. Blossom

Associate Professors J.L. Stephanic, K.J. Hartswick, P. Jacks

Assistant Professors T. Brown, C. Spangler, E. Speck, M.K. Tan

Adjunct Associate Professor C.R. Rose

Associate Professorial Lecturers A.B. Barnhart, L.D. Miller, J. Paradiso

Assistant Professorial Lecturers J.R. Spencer, P. Wright, C. Wilson, V. Freuhauf, S. Francoeur, S. Hutchison, A. McQueary

Bachelor of Arts with a major in art history—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Required courses in related areas—FA 137; Fren 4, Ger 4, Ital 4, or Span 4.
3. Required courses in the major—AH 71; 101 or 102; 104 or 105; 106 or 107; 109 or 110; 113 or 114; 117 or 118; 129; 148 or 149; 6 credit hours of AH 198; and 6 additional credit hours in 100-level art history courses, for a total of 39 hours.

Bachelor of Arts with a major in fine arts—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. A total of 51 hours of art courses is required of fine arts majors except for students with a concentration in photography, ceramics, and visual communication, for whom 54 hours are required.
3. Required basic fine arts courses: FA 21–22 and 41–42.
4. Required courses in art history: AH 31–32; 6 additional credit hours in 100-level art history courses.
5. Required fine arts courses in the major:
 - a. 12 hours, exclusive of primary area of concentration, in four of the following nine areas—ceramics, advanced drawing, advanced design, interior design, printmaking, painting, photography, sculpture, and visual communication.
 - b. 15 hours to be taken in the primary area of concentration (except for photography, ceramics, and visual communication).
 - c. 21 hours for students concentrating in photography: FA 23, 24, 123 or 124, 181, 182, 205, 206.
 - d. 21 hours for students concentrating in ceramics: FA 51, 52, 123 or 124, 133, 151, 152, 168.
 - e. 21 hours for students concentrating in visual communication: FA 163, 164, and five courses chosen in consultation with the advisor.
 - f. Students concentrating in interior design must consult with the area advisor for selection of courses.
6. Nine additional hours of electives may be taken in the Department of Fine Arts and Art History, except for students concentrating in photography, ceramics, and visual communication, who may take 6 hours of electives in the department.
7. Transfer students must take a minimum of 12 credit hours of 100-level fine arts courses at this University, of which 9 hours must be in their area of specialization.

Bachelor of Fine Arts with a major in interior design—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. A total of 120 credit hours, with 75 hours in the department and 45 hours of non-art courses.
3. Required foundation fine arts courses: FA 21–22, 42, 193.
4. Required art history courses: AH 31–32, 169–70.

5. Required fine arts courses in interior design:

a. FA 108, 109, 110, 113, 114, 117, 118, 119, 122, 130, 139.

b. 9 hours selected from FA 111, 112, 115, 116, 120, 121, 129.

6. 9 hours selected from course work in ceramics, advanced drawing, advanced design, printmaking, painting, photography, sculpture, visual communication (each course must be in a different area).

Bachelor of Arts with a combined major in art history and fine arts—The following requirements must be fulfilled in consultation with the departmental advisor:

1. The general requirements stated under Columbian College of Arts and Sciences.

2. A total of 30 hours in art history and 30 hours in fine arts.

a. Art history: AH 31–32, 71, and one course in each of the following areas—ancient, medieval, Renaissance, seventeenth and eighteenth centuries, nineteenth and twentieth centuries; 6 hours of art history electives.

b. Fine arts: FA 21–22, 41–42. The remaining 18 hours may be in one area of concentration or a combination of areas.

Five-Year Bachelor of Arts/Master of Arts in the field of art therapy—A program leading to the B.A. in the field of fine arts or psychology and the M.A. in the field of art therapy. The program is described under the Department of Psychology.

Special Honors—For graduation with Special Honors, students must have attained, by the end of the junior year, a grade-point average of at least 3.5 in the major and 3.0 overall. No later than the beginning of the senior year, students should consult their advisor regarding eligibility and selection of an area of study and a director of the research or creative arts project.

Minor in art history—Required: AH 31, 32 and 12 additional credit hours in 100-level art history courses for a total of 18 hours.

Minor in fine arts—Required: 18 credit hours of general course work in fine arts or in an area of concentration selected from design, drawing, ceramics, interior design, photography, painting, printmaking, sculpture, or visual communication. Students in the general program should consult the undergraduate fine arts advisor. Those selecting a specific area should consult with an advisor in the area of concentration.

Combined minor in art history and fine arts—Required: 9–12 hours of course work in art history and 9–12 hours in fine arts, for a total of 21 hours. A program of study is developed in consultation with the undergraduate advisors in art history and fine arts.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

ART HISTORY**31–32 Survey of Western Art (3–3)**

Robinson and Staff

A foundation for further study in the history of art. Art 31: prehistoric to Gothic art. Art 32: proto-Renaissance to modern art. (Art 31 and 32—fall and spring)

71 Introduction to the Arts in America (3)

Bjelajac

A survey of American art from the period of colonial exploration and settlement to the postmodern present. Political and social meanings of painting, sculpture, architecture, prints, and photographs. The relationship of art to religion, the occult, Masonic fraternalism, and nationalism; issues of class, race, and gender. (Fall)

101 Ancient Art of the Bronze Age and Greece (3)

Hartswick

A survey of Greek art from the Minoans and Mycenaeans (c. 2000 B.C.) to the age of Alexander (c. 300 B.C.). Relationships among the arts of the different groups in the Aegean area and their impact on Western culture. The Thera volcanic eruption, the "Dorian Invasion," the portrayal of women, "heroic nudity," and the assumption of a stylistic chronology. (Fall)

102 Ancient Art of the Roman Empire (3)

Hartswick

A survey of Roman art from the successors of Alexander the Great (c. 300 B.C.) to the fall of the Roman Empire in the West (c. 300 A.D.). The impact of the Greek world on Roman art and culture; innovations and achievements of the Romans in architecture, portraiture, and historical narrative. Focus on the city of Rome and other areas of the Roman world such as North Africa and Asia. (Spring)

- 104 **Italian Art of the 13th–15th Centuries (3)** Jacks
Origins, development, and theoretical foundations of Renaissance painting, sculpture, and architecture (Giotto, Duccio, Masaccio, Donatello, Ghiberti, Brunelleschi, Mantegna, Bellini, Botticelli). (Fall)
- 105 **Italian Art and Architecture of the 16th Century (3)** Jacks
The development of the universal genius within the circle of Florence and Rome (Leonardo, Raphael, Michelangelo) and their counterparts in Venice (Giorgione, Titian, Tintoretto, Sansovino, Palladio). (Spring)
- 106 **Northern Renaissance Art I (3)** von Barghahn
The 15th century: Flemish masters van Eyck, Campin, van der Weyden, Christus, Bouts, van der Goes, Memling, and David. Valois king Charles I and patronage by the dukes of Anjou, Berry, Orleans, and Burgundy. The late 15th-century French masters influenced by Flanders. (Fall)
- 107 **Northern Renaissance Art II (3)** von Barghahn
The 16th century: German masters Durer, Grunewald, Altdorfer, Grien, Cranach, and Holbein; the patronage of Maximilian I. Netherlandish masters Massys, Patiner, and Pieter Brueghel. French style at the courts of Francis I, Henri II, and Charles IX. (Spring)
- 108 **18th-Century Art in Europe (3)** Bjelajac
Painting, sculpture, and architecture in France, Great Britain, and Italy. Emphasis on Watteau, Chardin, David, Hogarth, Gainsborough, Reynolds, Canaletto, and Tiepolo. (Spring)
- 109 **European Art of the Early 19th Century (3)** Robinson
Examination of Neoclassicism and Romanticism in the context of Western European political, social, and cultural developments. Emphasis on France, England, and Germany and the representative styles of David, Ingres, Delacroix, Turner, Constable, and Friedrich. (Fall)
- 110 **European Art of the Late 19th Century (3)** Robinson
Examination of the revolution in style of Realism, Impressionism, and Post-Impressionism in the context of Western European political, social, and cultural developments. Emphasis on representative styles of Courbet, Manet, Monet, Morisot, Degas, Seurat, Cezanne, Van Gogh, and Gauguin. (Spring)
- 111 **Classical Archaeology (3)** Hartswick and Staff
Archaeological monuments of classical civilizations, with intensive study of one or more areas selected from architecture, sculpture, painting, or minor arts.
- 112 **Egypt and the Near East (3)** Hartswick and Staff
The great artistic tradition of the Nile Valley and the contemporary civilizations (ca. 3000 B.C. to after 1000 B.C.) between the rivers Tigris and Euphrates (present day Iraq) are explored. Emphasis on the Pyramid Age, the temples at Karnak and Luxor, the tombs of the Valley of the Kings, and the artistic traditions of the Sumerians, Akkadians, Babylonians, Assyrians, and Persians. (Fall)
- 113 **Italian Art and Architecture of the 17th Century (3)** Jacks
The Counter-Reformation and creation of the Baroque in painting, sculpture, and architecture in Rome (Carracci, Caravaggio, Bernini, Borromini, Pietro da Cortona), Turin (Guarini, Juvarra), and Venice (Longhena). (Spring)
- 114 **Flemish, Dutch, and English Baroque Art (3)** von Barghahn
Hapsburg Flanders and Brussels under the Spanish archdukes and their patronage of Rubens and his circle. The role of Dutch merchants commissioning diverse secular themes in Utrecht, Harlem, Delft, Leyden, and Amsterdam from "Golden Age" artists such as Rembrandt, Vermeer, and Hals. (Fall)
- 115 **Christian Iconography (3)** Staff
Origins and development of Christian symbols and themes from early Christian to the Council of Trent.
- 117 **Medieval Art I (3)** Anderson
Early Christian and Byzantine. (Fall)
- 118 **Medieval Art II (3)** Anderson
Romanesque and Gothic. (Spring)
- 119 **Islamic Religion and Art (3)** Nasr
Same as Rel 163.
- 121 **Spanish Art I (3)** von Barghahn
Discussion of areas selected from the art of the fourteenth through the seventeenth centuries. Specific topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the content differs.

- 122 Spanish Art II (3)** von Barghahn
Discussion of areas selected from the seventeenth through nineteenth centuries. Specific topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the content differs.
- 129 20th-Century Art in Europe (3)** Lader
Survey of 20th-century European painting, sculpture, and architecture, from their origins in the late 19th century through Surrealism. Emphasis on theory. Includes artists such as Matisse, Picasso, Kandinsky, Duchamp, and Mondrian. Prerequisite: AH 32 or 110. (Fall)
- 130 20th-Century Art in America (3)** Lader
Survey of 20th-century American painting and sculpture from the turn of the century to the beginnings of postmodernism with focus on the avant garde. Emphasis on artists of the Stieglitz circle and later modernist movements such as Abstract Expressionism, Pop, Op, Minimal, and Conceptual art. Includes theory and criticism. Prerequisite: AH 71, 110, or 129.
- 131 Modernist and Postmodernist Art and Theory (3)** Lader
Artists, art forms, and critical concepts from the 1940s to the present, focusing on Clement Greenberg's modernist theory and the development of postmodernist art and thought. Prerequisite: Art 129 or 130. (Spring)
- 145 Folk Arts in America (3)** Staff
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts. Same as AmSt 145.
- 147 Latin American Art (3)** von Barghahn
Ancient civilizations through modern. Specific topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 148 American Art I: Age of Revolution (3)** Bjelajac
Examination of American art during the 18th-century "consumer revolution," the American War for Independence, and the early republic. Emphasis on the socioeconomic and political purposes of art, with focus on Enlightenment symbolism and the visualization of national identity.
- 149 American Art II: Era of National Expansion (3)** Bjelajac
Examination of American art from the opening of the Erie Canal in 1825 to the Spanish-American War in 1898. Emphasis on the role of art in the expansion of the United States, exploring issues of race, class, and gender; art and religion.
- 150 Internship in Art History (3)** Staff
Open to candidates for the B.A. in art history only and with the approval of advisor in art history. May not be repeated for credit toward the degree. May be taken P/NP only.
- 155 Aegean Civilizations (3)** Hartswick
An introduction to the excavational and multidisciplinary aspects of classical archaeology. Minoan and Mycenaean civilizations (1700–1200 B.C.). Interrelationships between Greek and Persian cultures of the sixth and fifth centuries B.C.
- 156 Medieval Sculpture (3)** Anderson
In-depth study of sculpture of Early Christian period, Carolingian era, or High Middle Ages. Seminar format.
- 161 Studies in Renaissance Art (3)** Staff
- 162 Principles of Museum Work (3)** Staff
Introduction to the history and development of museums; problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service.
- 165 African, Oceanic, and North American Indian Art (3)** von Barghahn
Survey of architecture, sculpture, and painting from ancient kingdoms to early 20th-century culture. Emphasis on imagery and iconography.
- 167 The Art of Portugal (3)** von Barghahn
Portuguese art and culture from ancient Lusitania to the establishment of the Burgundian kingdom in the 12th century, the blossoming of Renaissance art during an age of exploration, and expansion to Africa, India, and Brazil. The achievements of the artists of the Baroque and the rebuilding of Lisbon after the 1755 earthquake.
- 169 History of Decorative Arts: European Heritage (3)** Staff
Survey of changing styles of European furniture, textiles, ceramics, and glass, in the context of general trends in art history and changing patterns in economic,

technological, social, and cultural history. From antiquity to the modern age. (Spring)

- 170 **History of Decorative Arts: American Heritage** (3) Staff
Examination of the decorative arts in America from the 17th century to the modern period. Exploration of changing visual characteristics in relation to the changing American experience. (Fall)
- 173 **History of the Cinema** (3) Staff
Same as EMda 173. Laboratory fee, \$35.
- 176 **American Architecture** (3) Longstreth
Same as AmSt 175.
- 177 **Modern Architecture: Europe and America, 1750-2000** (3) Jacks
Major developments in architecture and urbanism from the Industrial Revolution to the end of the 20th century. (Spring)
- 187 **East Asian Art** (3) Staff
Survey of the arts of China, Japan, and Korea.
- 188 **South Asian Art** (3) Staff
Survey of the arts of India, Pakistan, Sri Lanka, Nepal, and Tibet, from prehistoric times to circa 18th century.
- 191 **American Architecture** (3) Longstreth
Same as AmSt 176.
- 192 **The American Cinema** (3) Staff
Same as AmSt 192.
- 193 **Archaeology of Israel and Neighboring Lands** (3) Cline
The archaeology of Israel and adjacent areas (Syria, Jordan, Lebanon). Examination of many major sites and monuments. Significant problems and current debates. Same as Anth 188. (Fall)
- 195 **Independent Study** (1 to 3) Staff
Directed research and study in a specific area of art history to be approved by a faculty member. May be repeated for credit.
- 197 **History of Photography** (3) Lader
- 198 **Studies in Art History: Special Topics** (3) Staff
The historiography of art (readings in literature of art history from the Renaissance to the present) as well as other topics from ancient to contemporary art. Open to junior and senior art history majors; open to nonmajors by permission of instructor. May be repeated for credit provided the topic differs.

FINE ARTS

Note: Fine arts courses at the 100 level may be repeated for credit with approval of the department. Schedule of fees for FA 123-24: Ceramics—\$105; 2-D Design—\$24; 3-D Design—\$27; Drawing—\$75; Printmaking—\$54; Sculpture—\$35; Typography—\$75; Oil and Acrylic Painting—none; Watercolor—\$45; Photography—\$100; Visual Communication—\$100; Interior Design—\$100; Lithography—\$54; Serigraphy—\$75; Jewelry Design—\$36; Bookbinding—\$51.

- 21-22 **Design I: Basic** (3-3) Costigan, Stephanic
Required of all Fine Arts majors. Fundamental studies of principles and elements of design. FA 21: study of two-dimensional design. FA 22: three-dimensional studies. FA 21: Laboratory fee, \$24. FA 22: Laboratory fee, \$27. (FA 21 and 22—fall and spring)
- 23 **Photography I: Introduction** (3) Staff
Introduction to the principles of exposure and development of films and papers. Emphasis on creative expression. Laboratory fee, \$100. (Fall and spring)
- 24 **Photography II** (3) Staff
Continuation of FA 23. Experimentation with black and white films and developers. Improvement of printing and exposure techniques. Emphasis on control for creative expression. Prerequisite: FA 23. Laboratory fee, \$100. (Fall and spring)
- 41-42 **Drawing I** (3-3) Wright and Staff
Elementary investigation of concepts of drawing, both traditional and contemporary; training in perception, analysis of form in light and space; instruction in the use of graphic materials and media; exercises in connoisseurship. Material and model fee, \$75 per semester. (FA 41 and 42—fall and spring)

- 51 Introduction to Handbuilt Ceramics (3)** Ozdogan and Staff
Working with clay as an art form. Exploration of pinch, coil, slab, hump and press mold, paddling, and hollowing techniques. Sketch studies, reduction and oxidation kiln firings, clay and glaze making. Laboratory fee, \$105. includes unlimited materials and use of tools. (Fall and spring)
- 52 Introduction to Wheelthrown Ceramics (3)** Ozdogan and Staff
Development of cylindrical and open forms. Trimming, clay and glaze making, reduction and oxidation kiln firings. Sketch studies. Laboratory fee, \$105. including unlimited materials and use of tools. (Fall and spring)
- 57 Printmaking: Introduction to Relief (3)** Staff
Introduction to the basic methods of relief using linoleum and wood blocks. Black-and-white and color editioning. Laboratory fee, \$36. (Fall)
- 58 Printmaking: Introduction to Intaglio (Etching) (3)** Barnhart
Introduction to the basic methods of intaglio techniques, including etching, engraving, aquatint, drypoint, lift grounds, soft grounds, open bite, and mezzotint. Black-and-white and color editioning. Laboratory fee, \$36. (Spring)
- 61-62 Water Color (3-3)** Staff
Painting in transparent and opaque water color and in acrylic. Experimentation, figurative, and landscape. Laboratory fee, \$45 per semester. (Academic year)
- 65-66 Painting I (3-3)** Staff
Focus on fundamental technical and perceptual skills. Working with oils, assignments are based directly from life. Material and model fee, \$45 per semester. (Academic year)
- 81-82 Sculpture I (3-3)** Gates
Beginning study of design and fabrication of sculpture. Basic sculptural techniques for media, including clay, plaster, stone, and wood. Laboratory fee, \$35 per semester. (Academic year)
- 108 Architectural Drawing (3)** Staff
Basic graphic communication skills appropriate to the development of interior design projects. Two- and three-dimensional drawing skills developed through use of sketching, orthographic drawing, paraline drawing, and perspective techniques. Prerequisite: FA 42. Laboratory fee, \$100.
- 109 Interior Design Studio I (3)** Staff
Application of basic design concepts and introduction to the design process. Development of floor plans and elevations, furniture layouts, perspective drawings, and presentation boards for residential and commercial design. Prerequisite: FA 108. Laboratory fee, \$100.
- 110 Textiles and Finish Materials (3)** Staff
Textiles and finish materials for commercial and residential interiors. Physical properties, application, testing, regulations, and specification. Laboratory fee, \$100.
- 111 Furniture Design (3)** Staff
Principles and components of furniture design, both functional and aesthetic. Emphasis on construction, design, detailing of cabinetry and millwork. Development of design and technical skills. Two- and three-dimensional drawing models. Prerequisite: FA 109. Laboratory fee, \$100.
- 112 Computer-Aided Drafting for Interiors (3)** Staff
Introduction to basic CAD commands, two- and three-dimensional drawings, enhancement, and plotting. Using CAD as a tool to extend the design process. Prerequisite: FA 193. Laboratory fee, \$100.
- 113 Interior Design Studio II (3)** Staff
Residential interior design: single-family and multi-unit. Application of residential building technology, code requirements, and barrier-free design. Custom millwork and cabinetry design. Prerequisite: FA 109. Laboratory fee, \$100.
- 114 Interior Design Studio III (3)** Staff
Commercial interior design: office, restaurant, and retail. Application of building codes and ADA requirements. Layout and specification of contract and systems furniture. Commercial textiles and finish materials. Prerequisite: FA 113. Laboratory fee, \$100.
- 115 Studio in Historic Interiors (3)** Staff
Exploration and interpretation of significant periods of interior design through the study of historic furniture, decorative art, and architecture. Focus on appli-

- cation of historic styles for restoration or adaptive use. Prerequisite: AH 169 and 170. Laboratory fee, \$100.
- 116 **Textile Design and Construction** (3) Staff
Design and construction of various types of textiles, both woven and non-woven. Emphasis on the creative process and design development. Prerequisite: FA 21. Laboratory fee, \$100.
- 117 **Methods and Materials of Building Construction** (3) Staff
Study of building systems as they relate to design and function of interior spaces: mechanical, electrical, HVAC systems. Environmental concerns: energy, daylighting, and acoustics. Prerequisite: FA 108 and 110. Laboratory fee, \$100.
- 118 **Interior Design Studio IV** (3) Staff
Application of theories of human behavior and design in large-scale institutional settings, including public and private facilities serving medical, educational, and extended-care needs. Prerequisite: FA 114. Laboratory fee, \$100.
- 119 **Lighting Design** (3) Staff
Study of basic terminology, concepts, and principles of lighting design. Study of light and energy, incandescent and gaseous discharge lamps, luminaries, task requirements, measurement and calculation, human factors, and design applications for lighting. Prerequisite: FA 108. Laboratory fee, \$100.
- 120 **Design of Printed Textiles** (3) Staff
Surface pattern design of textiles. Source materials, design techniques, and development of technical skills. Prerequisite: FA 21. Laboratory fee, \$100.
- 121 **Environment and Behavior** (3) Staff
Study of interior design as it relates to the built environment and its effect on human behavior. Interior space as stage for social interaction. Evaluation of interior spaces using standard research methodology. Laboratory fee, \$100.
- 122 **Contemporary Issues in Interior Design Theory and Practice** (3) Staff
The roles and responsibilities of interior designers in the context of current social and technical forces. Topics include business procedure and practice, legal and ethical issues, and designer-client-contractor relations. Prerequisite: FA 108 and 110.
- 123-24 **Individual Problems** (1 to 6 each) Staff
Emphasis on problems and materials of specific interest to the student in any area of Fine Arts. Laboratory fee depending on area chosen. Prerequisite: permission of instructor.
- 125-26 **Painting II** (3-3) Staff
Work in oil from still lifes, landscapes, and figures to pursue challenges including color, gesture, light and paint quality. Material and model fee, \$45 per semester. (Academic year)
- 127-28 **Painting III** (3-3) Woodward
Studies in the interpretation of the figure and still life. Emphasis on color, space, planes, modulations. Alla prima and mixed techniques. Material and model fee, \$45 per semester. (Academic year)
- 129 **Presentation Techniques** (3) Staff
Advanced three-dimensional drawing using rapid visualization techniques, sketching, and constructed drawings. Development of multimedia rendering techniques. Prerequisite: FA 109. Laboratory fee, \$100.
- 130 **Internship in Interior Design** (3) Staff
Application of knowledge and skills in project-based setting for a local firm. Appropriate placement and sponsor participation required prior to registration. Prerequisite: FA 114 and senior standing.
- 131 **Intermediate Ceramics:** Ozdogan and Staff
Wheelthrown Functional Forms (3)
Aesthetic and technical development of wheelthrown functional ceramic forms. Exploration of attachments: lids, spouts, handles, and footing devices. Sketches and technical drawings, clay and glaze-making tests, varied temperature firings in reduction and oxidation atmospheres. Laboratory fee, \$105. (Fall and spring)
- 132 **Intermediate Ceramics:** Ozdogan and Staff
Wheelthrown Nonfunctional Forms (3)
Aesthetic and technical development of wheelthrown ceramic sculptural forms. Emphasis on section throwing, closed forms, and construction. Varied temperature firings in oxidation and reduction atmospheres. Clay and glaze making. Laboratory fee, \$105. (Fall and spring)

- 133 **Ceramic Decoration (3)** Ozdogan
Aesthetic and technical development of surface decoration, with experimental projects in sgraffito, mishima, engobe, majolica, underglaze, overglaze, and relief techniques. Laboratory fee, \$105.
- 134 **Nonsilver Printing Processes in Photography (3)** Staff
Introduction to nonsilver and archaic photographic processes. At least three processes will be explored. Emphasis on creative expression. Prerequisite: FA 23 and 24 or permission of instructor. Laboratory fee, \$100. (Spring)
- 135-36 **Advanced Water Color (3-3)** Staff
Development of techniques of water color; concentration on special projects. Laboratory fee, \$45 per semester. (Academic year)
- 137 **Workshop in Materials, Methods, and Techniques (3)** Woodward and Staff
Technical investigation of painting methods from the 14th century to the present. Preparation of grounds, media, underpainting, glazing. Laboratory fee, \$15. (Fall and spring)
- 138 **History of Printmaking (3)** Barnhart
Survey and demonstrations of methods and materials of printmaking techniques from 1400 to the present. Field trips to area collections. Laboratory fee, \$24. (Summer)
- 139 **Problems in Color (3)** Costigan
Intensive exploration of the objective rationale and subjective experience of color through the execution of problems in color contrast and color scales. Prerequisite: FA 21. Laboratory fee, \$18. (Spring)
- 141 **Interior Design (3)** Staff
Survey of basic interior design materials and techniques. Topics include floor plans and design, interior renderings, hard and soft materials, furniture styles. Laboratory fee, \$21. (Fall)
- 142 **Interior Design Problems (3)** Staff
A theoretical and practical in-depth exploration of a specific area of interior design. Topic to be announced in the *Schedule of Classes*. Prerequisite: FA 141 or equivalent. Laboratory fee, \$35. (Spring)
- 143-44 **Printmaking: Screenprinting (3-3)** Staff
Fine arts printmaking using serigraphic techniques. Utilization of all basic techniques; emphasis on aesthetic properties of prints. Laboratory fee, \$75 per semester. (Academic year)
- 146 **Ceramic Restoration, Conservation, and Installation (3)** Ozdogan
Methods and techniques of restoration, conservation, and installation of pottery, sculptural ceramics, and architectural ceramics, with modular and mixed media attachments. Emphasis on repair according to museum and collector specifications, using permanent and temporary finishings. Laboratory fee, \$105. (Summer)
- 151 **Ceramic History and Technology (3)** Staff
Emphasis on clay and glaze formulation and firing techniques, with related historical background. Laboratory fee, \$105. (Fall)
- 152 **Ceramic Sculpture (3)** Ozdogan
Developing an understanding of the sculptural ceramic form that integrates both quality and creativity. Techniques in hollow and solid construction. Varied temperature firings in reduction and oxidation atmospheres. Laboratory fee, \$105. (Fall)
- 153 **Printmaking: Intermediate Relief (3)** Barnhart
Further exploration of relief techniques using wood and linoleum. Intro to sintra and large formats using luan plywood among other materials. Prerequisite: FA 57. Laboratory fee, \$36. (Fall)
- 154 **Printmaking: Alternative Methods (3)** Barnhart
Exploration of alternative print techniques, i.e., collographs, monotypes, transfers. Emphasis on experimentation, concept, and personal style. Prerequisite: FA 153 or equivalent. Laboratory fee, \$36. (Spring)
- 157-58 **Printmaking: Intermediate Intaglio (3-3)** Barnhart
Intensive exploration of intaglio print techniques. Students may choose one or more to concentrate on and develop personal style. Prerequisite: FA 58 or equivalent. Laboratory fee, \$36. (Fall and spring)
- 159-60 **Drawing II (3-3)** Wright and Staff
Study and application of master drawing techniques. Investigation of perspective and anatomy. Emphasis upon conceptual development of personal style. Material and model fee, \$75 per semester. (Academic year)

- 163 **Visual Communication I: Basic Layout** (3) Molina and Staff
Layout stages, including basic formats, production processes; working with type and basic skills. Prerequisite: FA 171. Laboratory fee, \$100.
- 164 **Visual Communication II: Problem Solving** (3) Molina and Staff
Conceptual approach to problem solving. Various graphic design problems, including both small-format and large-format design in commercial and institutional graphics. Prerequisite: FA 163, 172. Laboratory fee, \$100.
- 166 **Advanced Drawing Techniques** (3) Staff
Specific area announced in the *Schedule of Classes*. May be repeated for credit if the area covered is different. Laboratory fee: FA 166.10, \$75; FA 166.11, \$90.
- 168 **Intermediate Ceramic Design in Handbuilding** (3) Ozdogan
Further concentration in handbuilding techniques of pinch, coil, slab, hump and press mold, paddling, and hollowing. Sketch studies, clay and glaze tests. Orientation to studio operations and maintenance. Laboratory fee, \$105. (Fall and spring)
- 171 **Typography I** (3) Molina and Staff
Basic calligraphy for traditional and contemporary use. Type theory, including specification, copy fitting, and study of letter form as used in graphic design. Laboratory fee, \$100.
- 172 **Typography II** (3) Molina and Staff
Study of type classification, recognition, and adaptation. Methods of type specification, copy fitting, and typesetting processes. Typographic layout and alphabet design. Prerequisite: FA 171. Laboratory fee, \$100.
- 174 **Visual Communication III: Computer Graphics** (3) Molina and Staff
Introduction to computer graphics in visual communication. The use of computers in the design process and as a tool for problem solving in graphic design. Laboratory fee, \$100.
- 175 **Printmaking: Lithography** (3) Barnhart
Study of methods and materials related to printing images from lithographic limestone and/or ball grained aluminum plates. Editioning in black-and-white and color. Laboratory fee, \$54.
- 179-80 **Sculpture II** (3-3) Gates
Expansion of Sculpture I, utilizing advanced wood milling equipment and metal welding techniques. Prerequisite: FA 81-82. Laboratory fee, \$35.
- 181 **Introduction to Color Photography** (3) Lake
Introduction to color through exposure and processing of color transparency films. Use of filters for creating and correcting color shifts, with emphasis on color as subject matter. Prerequisite: FA 23 and 24 or permission of instructor. Laboratory fee, \$100. (Fall)
- 182 **Introduction to Photographic Lighting** (3) Staff
Introduction to various lighting techniques. Available light manipulation, studio lighting, and copy lighting will be explored. Emphasis on creative expression. Prerequisite: FA 23 and 24 or permission of instructor. Laboratory fee, \$100. (Fall and spring)
- 183 **Experimental Photography** (3) Staff
Structured exploration of various photographic processes and techniques. Emphasis on creative expression. Content of course will vary; contact department for current offering. Prerequisite: FA 23 and 24 or permission of instructor. Laboratory fee, \$100. (Fall and spring)
- 184 **Jewelry Design and Techniques** (3) Gates
Laboratory fee, \$36. (Fall and summer)
- 186 **Portrait Painting and Drawing** (3) Staff
Model fee, \$45.
- 189-90 **Sculpture III** (3-3) Gates
Advanced study in concepts and materials through creation of three-dimensional forms concentrating on relevance of scale and media. Relationship of sculpture to the environment. Prerequisite: FA 179-80. Laboratory fee, \$35 per semester. (Academic year)
- 193 **Computer Design in the Fine Arts I** (3) Stephanie
Exploration of the use of computers as a visual arts medium. Topics include bit-mapped painting, object-oriented drawing, image scanning/manipulation, multimedia and Internet site design. Emphasis on creative expression. Laboratory fee, \$100.

194 Computer Design in the Fine Arts II (3)

Stephanic

Continuation of FA 193, with an emphasis on individual approach. Prerequisite: FA 193 or permission of instructor. Laboratory fee, \$100.

FORENSIC SCIENCES

The Department of Forensic Sciences offers graduate degree programs through Columbian College of Arts and Sciences. The following courses are available to undergraduates.

103-4 Introduction to Forensic Sciences (3-3)

Rowe

Topics in the application of science to the criminal justice system, including personal identification, analysis of drugs, forms of trace evidence, identification of biological fluids, forensic pathology, and forensic toxicology. Laboratory exercises. Prerequisite: two semesters of a laboratory science other than astronomy.

FRENCH

See Romance Languages and Literatures.

GEOGRAPHY

Professor D.C. McGrath (Chair)

Associate Professor M.D. Price

Assistant Professors D. Fuller, E. Chacko, I.K. Cheung, L.M. Benton

Professorial Lecturers G.T. Foggin, P. Mobley, E. Bruner

Assistant Professorial Lecturers W.J. Mallett, L. Marcus, M. Zeigler

Bachelor of Arts with a major in geography—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.

2. Required courses in the major—36 credit hours, including Geog 1, 2, 195, and EES 1. At least 6 credit hours must be chosen from each of the following groups: Group A (Physical/Environmental/Resources)—Geog 108, 110, 132, 134, 135, 136, 137; Group B (Human)—Geog 120, 125, 127, 140, 141, 145, 146; Group C (Techniques)—Geog 104, 105, 106, 107, 121, 153.

Minor in geography—Required: 21 credit hours, including Geog 1, 2, and one course from each of the groups listed under requirements for the major.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

1 Introduction to Human Geography (3)

Benton, Chacko

A systematic survey of human geography; cultural perspectives on the use of space, including urbanization, geopolitics, and land use. (Fall and spring)

2 Introduction to Physical Geography (3)

Fuller, Cheung

A systematic survey of environmental geography; perspectives on environments and human ecology, including ecosystems and their use, human population dynamics, and resource geography. (Fall and spring)

104 Introduction to Cartography and GIS (3)

Mobley

Cartographic techniques and map interpretation, compilation, and presentation; introduction to simple computer mapping, with emphasis on thematic mapping. Laboratory fee, \$55.

105 Techniques of Spatial Analysis (3)

Cheung

Nature of geographical inquiry and analytical methods used in the study of spatial processes and phenomena. Prerequisite: Geog 107.

106 Geographic Information Systems (3)

Cheung

Principles of geographic information systems and their use in spatial analysis and information management. Laboratory fee, \$55. Prerequisite: Geog 104 and 105.

107 Introduction to Remote Sensing (3)

Thomas, Fuller

Remote-sensing techniques using aerial photography, color infrared, microwave, and satellite imagery. Application to rural and urban settings, archaeology, and environmental monitoring. Laboratory fee, \$55. Prerequisite: Geog 105 or permission of instructor.

- 108 **Weather and Climate (3)** Cheung
The elements and controls of weather and climate; interpretation of surface weather maps. Introduction to synoptic climatology. Laboratory fee, \$55. Prerequisite: Geog 2.
- 110 **Climate and Human Ecology (3)** Cheung
Effects of climate on human activities. Examination of human-induced climate change. Prerequisite: Geog 2.
- 120 **World Regions: Problems and Prospects (3)** Price
Understanding of world environmental and cultural regions: the natural and human conditions that undergird current problems and future prospects.
- 121 **Advanced Geographic Information Systems (GIS) (3)** Cheung
Integration of GIS, remote sensing, and spatial modeling. Laboratory fee, \$55. Prerequisite: Geog 106.
- 124 **Urban Transportation (3)** Marcus
The relationship between freight and passenger transportation systems and urban land use patterns and structure. Prerequisite: Geog 1.
- 125 **Transportation and Communication (3)** Marcus
The structure and evolution of transportation and communication networks and their impact on regional development. Prerequisite: Geog 1.
- 127 **Population Geography (3)** Chacko
Patterns of world population; factors contributing to population pressures, growth, and migrations.
- 132 **Environmental Quality and Management (3)** Foggin, Fuller
The evolution of environmental management philosophies and tools. The global distribution, utilization, and degradation of natural resources. Prerequisite: Geog 2.
- 133 **People, Land, and Food (3)** Foggin
Domestication and dispersal of plants and animals; development of agricultural systems; spatial disparities in world food production, demand, and distribution.
- 134 **Energy Resources (3)** Staff
Analysis of regional patterns and trends in consumption and production of energy resources. Examination of international energy linkages and energy policies of selected nations. Prerequisite: Geog 2.
- 136 **Water Resources (3)** Foggin
Analysis of the global spatial patterns, development, use, and quality of water resources.
- 137 **Environmental Hazards (3)** Cheung
Examination of environmental hazards with emphasis on the use of geographic information systems. Prerequisite: Geog 2.
- 140 **Urban Geography (3)** Benton
Analysis of the internal spatial structure of cities; emphasis on patterns and dynamics of location within the city. Prerequisite: Geog 1.
- 141 **Cities in the Developing World (3)** McGrath, Chacko
Urbanization processes, problems, and management in the developing world. Focus on urban location, politics, housing, services, employment, and environmental issues. Prerequisite: Geog 1.
- 143 **Urban Social Geography (3)** Benton
Behavioral perspectives on human spatial activities in cities. Prerequisite: Geog 1.
- 144 **Explorations in Historical Geography (3)** Staff
Same as AmSt 144.
- 145 **Cultural Geography (3)** Staff
Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations. Prerequisite: Geog 1.
- 146 **Political Geography (3)** Price
Interrelationships among the human and physical environment and political systems; the organization of political territories.
- 147 **Military Geography (3)** Bruner
An examination of environmental and locational factors and their impact on military planning and operations.
- 151 **Geography of North America (3)** Foggin
An examination of the environmental, social, and economic factors that have led to development of the several regions of the U.S. and Canada.

- 154 **Geography of the Middle East and North Africa** (3) Staff
Cultural and physical regional patterns of the Middle East and North Africa.
Prerequisite: Geog 1 or 2.
- 161 **Geography of Latin America** (3) Price
Examination of spatial characteristics of physical and cultural phenomena in Latin America.
- 164 **Geography of Africa** (3) Fuller
Cultural and physical patterns of Africa. Prerequisite: Geog 1 or 2.
- 165 **Geography of South Asia** (3) Chacko
An examination of the complex interplay of environmental, economic, socio-cultural, and political factors in South Asia and their effects at the local and regional levels.
- 187 **Building Cities** (3) McGrath
Urban development dynamics and experience in the United States and abroad, including the pressures of social change. Background and insights needed by entrepreneurs and enlightened citizens to comprehend and play effective roles in contemporary city-building. Same as AmSt 187.
- 189-90 **Readings in Geography** (arr.) Staff
Prerequisite: 12 credit hours of geography and permission of instructor.
- 195 **Proseminar in Geographic Thought** (3) Foggin
For students completing the major in geography. Development of geographic thought, theories, and methodologies; geographic curricula. Prerequisite: permission of the advisor.
- 198 **Special Topics** (3) Staff
Consideration of geographic aspects of topical and future problems of society. May be repeated for credit provided that the topic differs. Prerequisite: Geog 1 or 2.
- 199 **Internship** (3) Staff
Fieldwork, internship, or other controlled assignment with an agency or organization engaged in work in applied geography. Prerequisite: 12 credit hours of geography courses and permission of instructor.

GEOSCIENCE

See *Earth and Environmental Sciences*.

GERMAN AND SLAVIC LANGUAGES AND LITERATURES

Associate Professors R. Robin (*Chair*), P. Rollberg, M.R. Gonglewski
Assistant Professors M.B. Stein, J. Ryfa, I. Heins, G. Shatalina, H. Franz
Professorial Lecturers S.P. Werres, Y. Olkhovskiy
Assistant Professorial Lecturers B.M. Pollack, L. Guslistova, E. Ovtcharenko

Bachelor of Arts with a major in German language and literature—The following requirements must be fulfilled.

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses—Ger 5-6 (or Ger 1-2, 3-4).
3. Required courses in the major—Ger 9-10, 109-10; two courses chosen from Ger 91-92 or 161-62; two courses chosen from Ger 111, 161-62 (if not taken above), 165, or the 180s series; four courses chosen from the Ger 170s series.

Bachelor of Arts with a major in Russian language and literature—The following requirements must be fulfilled

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses—Slav 5-6 (or Slav 1-2, 3-4) and Slav 91-92.
3. Required courses in the major—Slav 11-12, 109-10, 161, and 162; two courses chosen from Slav 171, 172, 173, 174; two courses chosen from Slav 165, 166, 185, 186.

Proficiency requirements for the Russian major. By the end of Slav 11, students consult their advisor to choose one of two proficiency tracks: (1) Emphasis on proficiency in speaking. Students choosing this track must attain speaking proficiency at the Intermediate High level, as measured by the ACTFL Oral Proficiency Interview. A semester of intensive language study in Russia on an approved program is required unless waived by the department. (2) Emphasis on proficiency in reading. Students choosing this track must attain reading proficiency at the Advanced level on the ACTFL scale, as measured by a departmental examination. Slav 101-102 is required, unless waived by the Department.

Special Honors in German—In addition to the general requirements stated under University Regulations, a candidate for special honors in German must have attained a 3.5 grade-point average in the major and at least a 3.0 average overall. Students must apply for honors candidacy by the end of the first semester of the junior year, must attain speaking proficiency at the Advanced level, as measured by the ACTFL Oral Proficiency Interview, and must successfully complete an honors thesis (Ger 197–98).

Special Honors in Russian—In addition to the general requirements stated under University Regulations, a candidate for special honors in Russian must have attained a 3.5 grade-point average in the major and at least a 3.0 average overall. Students must apply for honors candidacy by the end of the first semester of the junior year, must attain speaking proficiency at the Advanced level, as measured by the ACTFL Oral Proficiency Interview, and must successfully complete an honors thesis (Slav 197–98).

Minor in German language and literature—Ger 1–2, 3–4 (or Ger 5–6); Ger 9–10; two courses chosen from Ger 91–92, 109–10, or 161–62; two additional 100-level courses chosen from the German Language and Literature listing below.

Minor in Russian language and literature—Slav 1–2 and 3–4 (or 5–6), 9–10 (or 101–2), and four courses chosen from Slav 91–92, 161, 162, 165, 166, 171, 172, 173, 174, 185, 186.

Note: Completion of Ger 109 or 110 is prerequisite to courses in the Ger 170s series.

Placement Examination: A student who wishes to continue in college the language study begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

GERMAN LANGUAGE AND LITERATURE

- | | | |
|--------|---|----------------------|
| 1–2 | Basic German (4–4) | Gonglewski and Staff |
| | First part of beginning course in fundamentals of speaking, understanding, reading, and writing German. Prerequisite to Ger 2: Ger 1. Laboratory fee, \$50 per semester. (Academic year) | |
| 3–4 | Basic German (4–4) | Gonglewski and Staff |
| | Second half of beginning course in fundamentals of speaking, understanding, reading, and writing German. Prerequisite to Ger 3: Ger 2 or equivalent. Prerequisite to Ger 4: Ger 3. Laboratory fee, \$50 per semester. (Academic year) | |
| 5–6 | Intensive Basic German (8–8) | Gonglewski and Staff |
| | Beginning intensive course in fundamentals of speaking, understanding, reading, and writing German (equivalent to Ger 1–2 and 3–4). Recommended for majors. Prerequisite to Ger 6: Ger 2 or 5 or equivalent. Laboratory fee, \$70 per semester. (Academic year) | |
| 9–10 | Intermediate German (3–3) | Gonglewski and Staff |
| | Practice in speaking, listening, reading, and writing at the intermediate level. Prerequisite: Ger 4 or 6 or permission of instructor. Laboratory fee, \$50 per semester. (Academic year) | |
| 91–92 | Introduction to German Literature—in English (3–3) | Heins, Stein |
| | Ger 91: Survey of German literature from German myths through medieval literature, baroque, and the Enlightenment. Ger 92: Survey of German literature from the "Sturm und Drang" movement through Weimar classicism (Goethe, Schiller), romanticism (E.T.A. Hoffmann, the Brothers Grimm), realism, naturalism, and ending with expressionism. (Academic year) | |
| 101–2 | Readings in Contemporary German (3–3) | Werres and Staff |
| | Analysis of representative readings of expository prose from German newspapers, periodicals, and other publications. Prerequisite: for Ger 101, Ger 4 or 6 or equivalent; for Ger 102, Ger 101. (Academic year) | |
| 109–10 | Introduction to German Studies (3–3) | Heins, Stein |
| | An introduction to approaches, concepts, and analytical tools for study in the field, complemented by advanced practice in speaking, listening, reading, and writing. Prerequisite: Ger 10 or permission of instructor. (Academic year) | |
| 111 | Business German (3) | Gonglewski |
| | Introductory course preparing students to function in business-related communicative situations, with an emphasis on language skills necessary for work in areas such as marketing and finance. Prerequisite: Ger 10 or permission of instructor. (Spring) | |
| 161–62 | German Culture—in English (3–3) | Stein |
| | The central problems, issues, and events that have shaped the development of German culture from antiquity to the present. Emphasis on products and | |

processes of German culture in social, historical, and political contexts. (Academic year)

- 165 **20th-Century German Literature—in English (3)** Stein, Werres
Survey of the major trends in the works by modernist, exile, postwar, and contemporary German writers such as Kafka, Thomas Mann, Duerrenmatt, and Grass. (Fall)

- 171 **The Age of Goethe—in German (3)** Heins
Readings of major works of Weimar classicism in their historical and cultural context.

- 172 **From Romanticism to Realism—in German (3)** Heins
Readings in German romanticism, literature of the "young Germany" movement (Heine), and realism (Fontane, Storm).

- 173 **From Naturalism to Expressionism—in German (3)** Stein and Staff
Study of various literary movements between 1880 and 1914: naturalism, impressionism, symbolism, and expressionism (Hauptmann, Hesse, Thomas Mann, Kafka).

- 174 **Inside and Outside the Third Reich—in German (3)** Werres
Analysis of literary developments inside the Nazi state (propaganda literature, literature of resistance, and inner immigration) and the literature of exile (Seghers, Remarque).

- 175 **Literature of Two Germanies—in German (3)** Stein
Evolution of East and West German literatures after World War II, their separate developments and ultimate unification.

- 181 **History of German Cinema—in English (3)** Rollberg
A detailed historical and cultural survey of German cinema from the first moving picture devices (1895) to the expressionistic classics of the 1920s and the collapse of the Nazi film industry in 1945. All films are subtitled.

- 182 **The Fairy Tale from the Grimms to Disney—in English (3)** Stein
Survey of the changing form, structure, and meaning of the fairy tale in its traditional contexts, modern transformations and critical interpretations, with readings by 19th-century European collectors and 20th-century critics.

- 183 **Berlin Before and After the Wall—in English (3)** Stein
The political, social, and cultural developments in Berlin from 1945 to the present through a reading of selected primary documents, historical analyses, and short literary texts.

- 184 **German Thought—in English (3)** Heins
An overview of German ideas about culture, religion, society, and politics from the 16th century to the present. Readings from such writers as Luther, Leibniz, Kant, Schiller, Hegel, Marx, Nietzsche, Freud, Weber, Heidegger, Adorno, and Habermas.

- 185 **Literary Voices and the Fascist Experience—in English (3)** Werres
A survey of writers anticipating as well as reflecting on Germany's plunge into the totalitarian abyss of fascist politics, including H. Mann, Kafka, Juenger, Brecht, Werfel, Thomas Mann, Lenz, Frisch, Duerrenmatt, and various forms of Holocaust poetry.

- 186 **German Women Writers of the 19th and 20th Centuries (3)** Staff
The changing literary and social roles of German women of the 19th and 20th centuries, examined through selected readings of women's literary production and culture.

- 195 **Special Topics (3)** Staff
Directed study of German language, literature, or culture. May be repeated for credit. Students must obtain chair's approval and arrange for supervision by an appropriate member of the department. (Fall and spring)

- 197-98 **Senior Honors Thesis (3-3)** Staff
Senior honors thesis on a topic related to German language, literature, or culture. Required of and open only to honors candidates in the department. (Academic year)

SLAVIC LANGUAGES AND LITERATURES

- 1-2 **Basic Russian (4-4)** Shatalina and Staff
First part of beginning course in fundamentals of speaking, understanding, reading, and writing Russian. Prerequisite to Slav 2: Slav 1. Laboratory fee, \$50 per semester. (Academic year)

- 3-4 **Basic Russian (4-4)** Shatalina and Staff
Second half of beginning course in fundamentals of speaking, understanding, reading, and writing Russian. Prerequisite to Slav 3: Slav 2 or equivalent. Prerequisite to Slav 4: Slav 3. Laboratory fee, \$50 per semester. (Academic year)
- 5-6 **Intensive Basic Russian (8-8)** Robin and Staff
Beginning intensive course in fundamentals of speaking, understanding, reading, and writing Russian (equivalent to Slav 1-2 and 3-4). Recommended for majors. Prerequisite to Slav 6: Slav 2 or 5 or equivalent. Laboratory fee, \$70 per semester. (Academic year)
- 9-10 **Intermediate Russian (3-3)** Shatalina and Staff
Practice in speaking, listening, reading, and writing at the intermediate level. Prerequisite: Slav 4 or 6 or permission of instructor. (Academic year)
- 11-12 **Intensive Intermediate Russian (6-6)** Robin and Staff
Intermediate intensive course in speaking, understanding, reading, and writing Russian. Compared to Slav 9-10, includes additional practice in language skills. Prerequisite: Slav 4 or 6 or permission of instructor. Recommended for majors. (Academic year)
- 13-14 **Russian for Heritage Speaker (3-3)** Staff
Prepares heritage speakers of Russian for advanced study in Russian at the third-year level and beyond, including content courses in literature and area studies. (Academic year)
- 21-22 **Basic Czech (3-3)** Staff
Beginning course in fundamentals of speaking, understanding, reading, and writing Czech. Prerequisite to Slav 22: Slav 21 or equivalent. Laboratory fee, \$50 per semester. (Offered when the demand warrants)
- 23-24 **Basic Second-Year Czech (3-3)** Staff
Second half of beginning course in fundamentals of speaking, understanding, reading, and writing Czech. Prerequisite to Slav 23: Slav 22; prerequisite to Slav 24: Slav 23. (Offered when the demand warrants)
- 31-32 **Basic Polish (3-3)** Staff
Beginning course in fundamentals of speaking, understanding, reading, and writing Polish. Prerequisite to Slav 32: Slav 31. (Offered when the demand warrants)
- 33-34 **Intermediate Polish (3-3)** Staff
Practice in speaking, listening, reading, and writing at the intermediate level. Prerequisite: Slav 32. (Offered when the demand warrants)
- 91-92 **Introduction to Russian Literature (3-3)** Ryfa
(In English.) Slav 91: Russian literature and society, 1800-1860s, concentrating on the Golden Age of Russian literature; poems and stories by Pushkin, Lermontov, Gogol, and Turgenev. Slav 92: Russian literature and society on their way to modernity; great works of prose and drama by Dostoevsky, Tolstoy, Chekhov, and Bunin. (Academic year)
- 101-2 **Readings in the Russian Press (3-3)** Guslistova
Reading and analysis of current Russian periodicals. For graduate students with a reading-language proficiency requirement.
- 109-10 **Russia Today: Topics in Advanced Russian (3-3)** Robin
Practice in speaking, listening, reading, and writing at the advanced level. Prerequisite: Slav 10 or 12 or permission of instructor. (Academic year)
- 151-52 **Literature and Culture of the Western Slavs—in English (3-3)** Ryfa
A broad overview of the cultural developments in Western Slavic nations (Poles, Czechs, and Slovaks) from the dawn of Slavic literacy in the ninth century to the present. An interdisciplinary and comparative approach covers a wide range of cultural fields: the history of the region, literature, architecture, visual arts, science, philosophy, music, and religion.
- 161 **Russian Culture to 1825 (3)** Ryfa
Survey of Russian cultural heritage from its ancient origins through the early 19th century. Architecture from the medieval period through the end of the Empire style. Iconography, the influence of the Church, and effects of the West on Russian culture.
- 162 **Russian Culture since 1825 (3)** Ryfa
Survey of Russian culture from the 19th century through the present, including intellectual movements; realism in music, art, and theatre; ballet; avant-garde painting; and effects of Soviet policies and of Perestroika.

- 165 **20th-Century Russian Literature to World War II (3)** Ryfa
Russian literature and culture of the first half of the 20th century: the impact of the revolution on writers and literature; avant-garde, socialist realism, and emigre literature (Nabokov)—in English.
- 166 **Russian Literature from World War II to the Present (3)** Ryfa
Literature in wartime and in postwar years from Solzhenitsyn to the latest trends: the "thaws," village and urban prose, post-Soviet literature, Russian postmodernism—in English.
- 171 **19th-Century Russian Prose (3)** Ryfa
Reading and discussion of selected prose texts of the 19th century from Pushkin to Chekhov—in Russian. Prerequisite: Slav 10 or 12 or equivalent; Slav 91–92. (Fall, even years)
- 172 **19th-Century Russian Poetry (3)** Ryfa
Reading and discussion of selected poetry of the 19th century (Pushkin, Lermontov, Nekrasov, and others)—in Russian. (Spring, odd years)
- 173 **20th-Century Russian Prose (3)** Ryfa
Reading and discussion of selected prose of the 20th century from Bunin to Solzhenitsyn—in Russian. (Fall, odd years)
- 174 **20th-Century Russian Poetry (3)** Ryfa
Reading and discussion of selected poetry of the 20th century from Blok to Brodsky—in Russian. Prerequisite: Slav 10 or 12 or equivalent; Slav 165, 166. (Spring, even years)
- 185–86 **Introduction to Russian Cinema (3–3)** Rollberg
(In English; all films subtitled.) Slav 185: From Russian silents to the introduction of sound and color (1896–1946). The great revolutionary directors—Eisenstein, Pudovkin, Dovzhenko. Slav 186: From post-war to post-perestroika cinema (1946–1996): war films, adventure, films about youth.
- 195 **Special Topics (3)** Staff
Directed study of East European languages, literatures, or cultures. May be repeated for credit. Students must obtain chair's approval and arrange for supervision by an appropriate member of the department. Prerequisite for Russian: Slav 9–10 or 11–12, 91–92, 165, 166.
- 197–98 **Senior Honors Thesis (3–3)** Staff
Senior honors thesis on a topic related to Russian language, literature, or culture. Required of and open only to honors candidates in the department.

GREEK

See **Classical and Semitic Languages and Literatures**.

HEALTH SCIENCES

The following courses, offered by the Health Sciences Programs in the School of Medicine and Health Sciences, are available to undergraduates across the University and constitute a major portion of the secondary field in health sciences. Prerequisites may be established for the courses. For information on bachelor's degree programs in health sciences, please contact the Office of Recruitment and Admissions for Health Sciences Programs in the School of Medicine and Health Sciences.

- 101 **Psychosocial Aspects of Health and Illness (3)**
Comprehensive introduction to the psychological and social aspects of health and wellness. Emphasis on the development of communication skills and the establishment of caring relationships. Discussions of special situations such as working with dying patients and patients with self-destructive behaviors.
- 102 **Pathophysiology (3)**
Biomedical and scientific framework for the understanding of human disease mechanisms and biologic processes. Lecture presentations cover infectious, immunologic, cardiovascular, genetic, respiratory, gastrointestinal, neoplastic, reproductive, renal, hematologic, neurologic, and musculoskeletal diseases.
- 103 **Health Policy and the Health Care System (3)**
Incorporates economic theory and policy analysis methodology to analyze the impact of changes in the health care system on the practice of health sciences professionals and the quality and process of health care. Development of critical thinking skills through review of current medical literature.

104 Management of Health Science Services (3)

Application of management and organizational principles to the delivery of services provided by health sciences disciplines. Issues addressed include information systems, leadership, team building, fiscal management, human resources management, quality improvement, and management of conflict and change.

HEBREW

See **Classical and Semitic Languages and Literatures**.

HISTORY

Professors H.M. Sachar, R. Thornton, P.F. Klarén, R.E. Kennedy, Jr., W.H. Becker, L.P. Ribuffo, E. Berkowitz (*Chair*), R.H. Spector, J.O. Horton, L.L. Peck, H. Judson (*Research*), M.E. Saperstein, R.J. Cottrol, D.K. Kennedy, A.M. Black (*Research*), M.A. Atkin

Associate Professors A.D. Andrews, R.B. Stott, H.L. Agnew, E.A. McCord, C.E. Harrison, D.R. Khoury, T. Anbinder, J. Hershberg, H.M. Harrison

Assistant Professors A.L. Alexander, D. Yang, S. McHale, N. Comfort, N.G. Seavey (*Research*), E.A. Fenn, A. Zimmerman, K.W. Larsen, M. Norton, N. Blyden, G.A. Brazinsky, H. Abugideiri

Adjunct Associate Professor K. Bowling

Director and Principal Investigator of the First Federal Congress Project C. Bickford

Bachelor of Arts with a major in history—The following requirements must be fulfilled:

1. Majors must meet the general requirements of Columbian College of Arts and Sciences, selecting specific courses in consultation with either a departmental or college advisor.

2. Majors must either take or waive three of the following four introductory courses: Hist 39–40 and 71–72. Waiver may be accomplished by passing a departmental examination, which is held near the beginning of classes. Credit as well as waiver may be obtained by departmental examination or by scoring 4 or 5 on the Advanced Placement Examination, and waiver may be obtained by scoring 650 or above on the College Board Achievement Test. Neither waiver nor credit is awarded by CLEP subject examination.

3. Majors must complete Hist 198 and 199, plus seven courses chosen from groups (a), (b), and (c), below, with the following distribution: at least three courses from one of the groups, at least two courses from a second group, at least one course from the third group, with the seventh course chosen from any of the three groups.

(a) Europe—Hist 103, 104, 109, 110, 111, 112, 113, 121, 122, 123, 124, 125, 131, 132, 136, 141, 142, 144, 147, 148, 149, 150, 151, 152, 153, 154, 155, 157, 158, 159

(b) United States—Hist 103, 104, 117, 126, 127, 129, 133, 134, 137, 138, 139, 140, 160, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 182, 184, 185, 186, 197

(c) Russia, Asia, Africa, and Latin America—Hist 103, 104, 107, 108, 116, 117, 118, 126, 127, 145, 146, 158, 161, 162, 163, 164, 187, 188, 189, 193, 194, 195, 196

Special topics courses numbered 101 and courses in the 700 Series may also satisfy one of the three field requirements. Majors should check with the major advisor on the applicability of such courses.

For Special Honors in history, a history major must (1) meet the general honors requirements listed under University Regulations; (2) apply for honors candidacy and complete Hist 199 before the end of the junior year; and (3) in the ensuing semester, enlarge upon the research project undertaken in Hist 199 while enrolled in Hist 191. Only if the thesis completed in Hist 191 merits the grade of A or A– will Special Honors be recommended.

Minor in history—Undergraduate students who select a minor in history must ordinarily declare their intention to the departmental advisor no later than the beginning of their senior year. Such students may choose a nonspecialized history curriculum, or may concentrate in one area, such as ancient history, medieval history, early modern Europe, modern Europe, the Middle East, Russia and East Europe, the United States, Latin America, or the Far East, or in one field, such as economic, social, intellectual, diplomatic, political, black, or women's history. In each case the program of courses will be planned in consultation with the history advisor. To meet the departmental requirements for a minor, the student must complete one course chosen from Hist 39, 40, 71, or 72 and at least five additional approved 100-level history courses.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Waiver Examinations: Waiver examinations are given three times per year, near the beginning of classes in the fall and spring semesters and the first summer session.

Course Accessibility: All 100-level courses are open to students without history course prerequisites with the exception of Hist 136, 157, 191, 192, 198, and 199.

- 39-40 **European Civilization in Its World Context (3-3)** Staff
Hist 39: Introduction to the political, social, economic, religious, and cultural history of Europe from about 800 A.D. to 1715. Hist 40: From 1715 to the present. (Academic year)
- 42 **Women in Western Civilization (3)** Staff
Same as WStu 1.
- 50 **Washington, D.C.: History, Culture, and Politics (3)** Staff
Same as AmSt 50.
- 71-72 **Introduction to American History (3-3)** Staff
Hist 71: political, social, economic, and cultural forces of the United States, from the earliest settlements to 1876. Hist 72: from 1876 to present. (Academic year)
- 101 **Special Topics (3)** Staff
Historical perspectives on great issues of past and present. The topic each semester will be announced in the *Schedule of Classes*.
- 102-3 **History of Science (3-3)** Comfort
Survey of Western science, technology, and medicine. Hist 102: From ancient Egypt and Mesopotamia to the Renaissance Scientific Revolution. Hist 103: From the 18th century to the present. (Academic year)
- 104 **Topics in the History of Recent Science (3)** Staff
Aspects of 20th-century science and its immediate antecedents. May be repeated for credit.
- 105 **European Civilization to 800 A.D. (3)** Cline
Introduction to the political, social, economic, and religious history of Europe from the beginnings of recorded history to 800 A.D. Same as Clas 115.
- 107 **The Ancient Near East and Egypt to 322 B.C. (3)** Cline
Survey of Egyptian, Mesopotamian, Anatolian, West Semitic, and Iranian civilizations from the Neolithic period to Alexander's conquest. Same as Clas 117.
- 108 **History of Ancient Israel (3)** Cline
The history of ancient Israel from the Patriarchs through the Romans. Topics include historical, archeological, political, social, cultural, religious, diplomatic, military, economic, and intellectual events, movements, and relationships. Same as Clas 118. (Spring, alternate years)
- 109 **Early Aegean and Greek Civilizations to 338 B.C. (3)** Cline
Neolithic background; Bronze Age—Minoan, Helladic, and Mycenaean civilizations; classical Greek civilization to the Macedonian conquest. Same as Clas 119. (Fall)
- 110 **The Roman World to 337 A.D. (3)** Cline
Prehistoric Italy; rise and decline of the Roman Empire and Latin civilization; cultural, social, and political developments in the Greek world under Roman rule. Same as Clas 120. (Spring)
- 111-12 **Medieval History (3-3)** Andrews
Hist 111: Evolution of the Roman Empire into the Byzantine and Islamic cultures and new societies in the West; the rise of Latin Christendom until about 1050 A.D. Hist 112: Medieval European daily life, institutions, and creative movements to about 1400. (Academic year)
- 113 **History of the Jews in Christian Europe to the 18th Century (3)** Saperstein
The position of Jews in relation to Church and State; organization and self-government of the Jewish community; movements of Jewish spirituality; divisions within Jewish society; the background of Emancipation and Enlightenment. (Fall)
- 114 **History of the Jews in Islamic Lands (3)** Saperstein
The legal status of Jews under Islam; the impact of the Muslim conquest and Abbasid rule over the Jewish community of Babylon, the flourishing of Jewish civilization in Muslim Spain; Metatherian Jewish society in the Middle Ages; the Ottoman Empire; modernity and its effects. (Fall, alternate years)

- 115 **Messianic Movements and Ideas in Jewish History** (3) Saperstein
A survey of Messianism as a central force in Jewish history, stressing both theoretical implications and concrete manifestations. Topics include Biblical Christianity, the origins of Christianity as a Jewish Messianic movement, the Sabbatian movement, Zionism, and contemporary messianism. (Fall, alternate years)
- 116 **History of Africa** (3) Abugideiri
Survey of political, cultural, and economic development from ancient times to the present, with emphasis on the rise and demise of European colonialism.
- 117 **The British Empire** (3) D. Kennedy
The British Empire from its rise in the 17th century to its demise in the 20th century. (Alternate years)
- 118 **China to 1800** (3) McCord
Survey of Chinese civilization from its ancient beginnings to the last imperial dynasty. (Fall)
- 121 **The Age of the Renaissance** (3) Andrews
Emergence of new forms of expression, and politics and society in Europe from the 14th century to about 1550. Emphasis on Italy and the Byzantine background. (Spring)
- 122 **The Reformation in Western Europe** (3) Staff
Religious, political, and social consequences of the theological upheavals of the 16th century. (Spring)
- 123-24 **European Intellectual History** (3-3) E. Kennedy
Hist 123: The "Century of Genius" and the Enlightenment; God, nature, man, and society, from Descartes to the French Revolution. Hist 124: Responses to the French Revolution and the Enlightenment; historicism, evolution; nihilism, psychoanalysis; communism; fascism; existentialism, structuralism, postmodernism, and neo-orthodoxy. (Alternate academic years)
- 125 **Women in European History** (3) Staff
A study of the role of women in the political, social, intellectual, and economic life of Europe from the Middle Ages to the 20th century. (Spring)
- 126 **The United States and the Wars in Indochina, 1945-1975** (3) Spector
The American role in the Indochina Wars, emphasizing the period 1961-1975, and from the perspectives of the Vietnamese, French, and Americans in Vietnam. Related intellectual and political developments in the United States; Cold War relationships with China and the Soviet Union. (Fall)
- 129 **War and the Military in American Society from the Revolution to the Gulf War** (3) Spector
Social and psychological dimensions of war and military service. (Spring)
- 131-32 **History of Germany** (3-3) Zimmerman
Political, social, and cultural development. Hist 131: From mid-17th century to Bismarck. Hist 132: From William II to the present. (Academic year)
- 133 **Recent U.S. History, 1890-1945** (3) Ribuffo, Berkowitz
Political, social, diplomatic, and intellectual developments, with particular emphasis on the "searching" '20s and New Deal. (Fall)
- 134 **Contemporary U.S. History Since 1945** (3) Ribuffo
Political, social, diplomatic, and intellectual developments, with particular emphasis on the Cold War, "silent" '50s, and disrupted '60s. (Spring)
- 135 **The Two Germanys and the Cold War** (3) H. Harrison
Why was Germany divided after World War II? Why did it stay divided for 45 years? How was it reunited in 1990? This course examines developments in East and West Germany, relations between the two Germanys during the Cold War, their foreign policies, and how other countries treated them.
- 136 **Europe in the 20th Century** (3) Sachar
Diplomatic, political, and cultural developments from the turn of the century to the present. Credit may not be earned for both Hist 136 and 157. Prerequisite: Hist 40. (Spring)
- 137-38 **History of American Foreign Policy Since World War II** (3-3) Thornton
Emphasis on American and Soviet strategy and foreign policy in the era of the Cold War. Hist 137: World War II to the Vietnam War; Hist 138: Vietnam to the "New World Order." (Academic year)

- 139-40 **Women in the United States (3-3)** Murphy, C. Harrison
Survey of women's experience in U.S. history, the way gender has organized relations of power, and the impact of race, region, class, and ethnicity on women and on gender roles. Same as AmSt/WStu 139-40. (Academic year)
- 141-42 **History of France (3-3)** E. Kennedy
Hist 141: Old Regime: monarchy and social classes; the Church; the Enlightenment; the 1789 revolution; Napoleon. Hist 142: From 1814: breaks and continuities in the succession of regimes; the interplay between revolution and tradition; the weakened international position of France; Gaullism and the survival of France; European Unity. (Alternate academic years)
- 143 **The Making of the Modern Balkans (3)** Agnew
States of the Balkan peninsula—Slovenia, Croatia, Serbia and Montenegro, Bosnia, Albania, Macedonia, Greece, Bulgaria, and Romania—including developments since the decline of the Ottoman Empire and the emergence of Balkan nationalist movements, and continuing through the collapse of the Soviet bloc. (Fall, alternate years)
- 144 **The Habsburgs in East Central Europe (3)** Agnew
History of the Habsburg monarchy in its East Central European Context. Reformation and Counter-Reformation; conflict with the Ottoman Empire; great-power competition in Europe; response to the Enlightenment and the French Revolution; the rise of nationalism; and final dissolution in World War I. (Fall)
- 145 **Russia to 1801 (3)** Atkin
Survey of Russian history from the rise of the Kievan confederation in the ninth century to the establishment of Imperial Russia as a European great power. Attention will be given to the political, socioeconomic, and cultural history of the East Slavs, especially the Russians. (Fall)
- 146 **Russia Since 1801 (3)** Atkin
Survey of Russian and Soviet history from the reign of Alexander I to the post-Stalin era. Attention will be given to the contending forces of revolution, reform, and conservatism; diplomatic relations; economic development; and social change. (Spring)
- 147 **Victorian Britain (3)** D. Kennedy
Examines major themes in nineteenth-century British history: industrialism, democratization, urbanization, imperial expansion, class and gender schisms. (Fall, alternate years)
- 148 **The French Revolution (3)** E. Kennedy
Social, political, economic, and cultural history of the decade of revolution, 1789-1799. Attention to its structural consequences in France and in Europe at large. (Fall)
- 149 **Spain and Its Empire, 1492-1700 (3)** Norton
Major transformations of the period: from cultural pluralism to ethnic homogeneity, from medieval fragmentation to imperial expansion in Europe and America; from religious reform to Catholic Reformation, from global dominance to decline. (Fall)
- 150 **Twentieth-Century Britain (3)** D. Kennedy
Examines major themes of twentieth-century British history: industrial decline, imperialism and decolonization, the making of a welfare state, the cataclysm of global war, integration with Europe. (Spring, alternate years)
- 151-52 **History of England (3-3)** Peck
Development of English civilization and its impact on Western culture. Hist 151: To 1689. Hist 152: Since 1689. (Academic year)
- 153 **Tudor England (3)** Peck
Aspects of the constitutional, social, intellectual, economic, and religious development of England, 1485-1603. (Fall)
- 154 **Stuart England (3)** Peck
The civil wars, Restoration, and Glorious Revolution. Political, religious, socioeconomic, and intellectual developments in England, 1603-1714. (Spring)
- 155 **History of Modern Ireland (3)** Staff
The political and cultural development of Ireland since the Middle Ages and the continuing interaction between Ireland and England, with emphasis on the period from the Act of Union of 1801 to the Partition of 1923.

- 157 **20th-Century European Diplomatic History** (3) Sachar
The main currents, with necessary 19th-century background, and related attention to the Middle East. Credit may not be earned for both Hist 136 and 157. Prerequisite: Hist 40. (Fall)
- 158 **Modern Jewish History** (3) Sachar
A secular history of the Jewish people from the 18th century to the present state of Israel; emphasis on European and Middle Eastern political, economic, and cultural influences. (Spring)
- 159 **The Holocaust** (3) Saperstein
The origins, causes, and significance of the Nazi attempt to destroy European Jewry, within the context of European and Jewish history. Related themes include the behavior of perpetrators, victims, and bystanders; literary responses; contemporary implications of the Holocaust for religion and politics. (Spring)
- 160 **History of the Jewish People in America** (3) Sachar
The study of the Jewish minority in America from colonial times to the present. Emphasis on the interaction between a powerful majority culture and that of protean minority people. Prerequisite: Hist 39-40 or 71-72. (Spring, alternate years)
- 161 **Jewish Historical Writing** (3) Saperstein
A survey of Jewish attitudes toward history and examples of Jewish historiography beginning with the Hebrew Bible. Emphasis will be on medieval and Renaissance historians and on the flourishing of historical writing in the past 150 years in Europe, Israel, and the United States. (Fall, alternate years)
- 162 **20th-Century Latin America** (3) Klarén
A survey of the main societal trends shaping Latin America in this century, with particular emphasis on such themes as populism, urbanization, reformism, modernization, nationalism, revolution, the military dictatorship, and the development process. (Spring)
- 163-64 **History of Latin America** (3-3) Klarén
Hist 163: Analysis of Spanish and Portuguese imperialism in the New World, 1492-1820. Hist 164: A problems approach to Latin America, 1820 to the present; thematic emphasis on neocolonialism, corporatism, liberalism, *caudillismo*, modernization, populism, and revolution. (Academic year)
- 165 **Revolution in 20th-Century Latin America** (3) Klarén
Examination of the major social revolutions in modern Latin America, especially in Mexico, Bolivia, Cuba, and Nicaragua; their origins, ideology, process, and outcomes. (Fall)
- 166 **Immigration, Ethnicity, and the American Experience** (3) Anbinder
Examination of the role of immigration, ethnicity, and ethnic conflict in American life, past and present, with particular attention to the urban immigrant experience, and the prevalence of anti-immigrant sentiment throughout U.S. history. (Fall)
- 167 **Themes in U.S. Cultural History** (3) Mergen
Same as AmSt 167.
- 168 **America Before 1764** (3) Fenn
An examination of prehistory, colonization, and the shifting dynamics among European Americans, African Americans, and Native Americans before 1764. (Spring, alternate years)
- 169 **Revolutionary America** (3) Fenn
An examination of the War of Independence and other events that reshaped life for Native Americans, African Americans, and European Americans in the era of the American Revolution; emphasis on a continental approach to the period. (Spring, alternate years)
- 171-72 **U.S. Social History** (3-3) Horton, Stott
Hist 171: Daily life, institutions, intellectual and artistic achievements of the agrarian era, 1607-1861. Hist 172: The urban-industrial era from 1861 to present. Same as AmSt 171-72. (Academic year)
- 173 **African American History** (3) Horton, Alexander
Survey of the African American experience, emphasizing the contributions of black Americans to and their impact upon American history. Same as AmSt 173. (Fall)

- 174 **Special Topics in African American History** (3) Horton
Concentration on specific issues central to the African American experience. Consult *Schedule of Classes* for issues to be addressed. (Spring)
- 175 **U.S. Constitutional History** (3) C. Harrison
Examination of the text and interpretation of the document that is the foundation of the American government, with special attention to the changing character of race and gender as constitutional classes. (Fall, alternate years)
- 176 **The Modern American Presidency** (3) Berkowitz
The development of the modern American presidency, from Theodore Roosevelt to Bill Clinton, examining the intersection of personal and impersonal forces in the creation of modern America.
- 177 **The Jacksonian Era and the Rise of Mass Politics** (3) Anbinder
The period 1828–1860 and its continuing significance to American society: emphasis on racial and gender divisions and changes in the legal and political systems. (Fall, alternate years)
- 178 **History of the American West** (3) Stott
The interaction of environment and cultures among the different peoples vying for occupancy of the trans-Mississippi region of the United States from the early 19th century to the present. (Fall, alternate years)
- 179 **U.S. Economic History** (3) Berkowitz
Survey of American economic history from colonial times to the present. Particular attention is given to the economics of slavery, the development of a national industrial economy, and the growth of the federal government as an influence on economic policy.
- 182 **U.S. Diplomatic History** (3) Hershberg
American foreign relations in the 20th century.
- 183 **International History of the Cold War** (3) Harrison, Hershberg
Key events and themes of the Cold War, drawing on new evidence from U.S., Soviet, Chinese, German, East European, Vietnamese, Cuban, and other sources. Related historiographical controversies from multiple national perspectives. Why the Cold War began, why it lasted for 45 years, and why it ended.
- 184 **Civil War and Reconstruction** (3) Anbinder
How tensions between the sections developed into violence, how a total war was fought on American soil, and how the experience of war affected the generation that lived through it. (Spring, alternate years)
- 185 **Black Women in U.S. History** (3) Alexander
Black Women from the Middle Passage to contemporary times. Same as AmSt/WStu 185. (Fall)
- 186 **U.S. Urban History** (3) Heap
The American city from colonial foundations to the present, relating social and economic forces to physical form. Special emphasis on transitions from pre-industrial to industrial to metropolitan forms, focusing on implications for public policy and historic preservation. Same as AmSt 186. (Fall)
- 187 **History of Modern China** (3) McCord
China since 1840, with particular attention to political developments. (Fall)
- 188 **History of Chinese Communism** (3) Thornton
Survey of the leadership, ideology, structure, and foreign and domestic policies of the Chinese Communist Party from its inception to the present. (Fall)
- 189 **History of Modern Japan** (3) Yang
Japan's century of modernization—from the Meiji Restoration of 1868 to the present. Emphasis on historical, political, economic, and cultural factors. (Fall)
- 190 **History of Korea** (3) Larsen
An introduction to the history and culture of Korea from antiquity to the present. (Fall)
- 191 **Senior Honors Thesis** (3) Staff
Required of and open only to undergraduate honors candidates in history.
- 192 **Internship** (3) Staff
Study of history through internships in museums, libraries, Congress, or other appropriate institutions and agencies. Prerequisite: approval of department. (Fall and spring)

- 193 **History of the Middle East (3)** Khoury
Byzantine, Arab, Persian, and Islamic backgrounds; rise and decline of the Ottoman Empire; action of European powers in the area; Ottoman breakup into the Turkish Republic and other states. (Fall)
- 194 **History of the Modern Middle East (3)** Khoury
Beginning with Napoleon's invasion of Egypt. Development of nationalism and of modern states; impact of the West on culture and institutions; great-power imperialism; crises of Turkish Straits, Suez, Arab-Israeli relations; and other issues. (Spring)
- 196 **The Modern Transformation of East Asia (3)** McCord, Yang
The social, institutional, and intellectual transformation of China, Japan, and Korea from the mid-19th century to the present. (Spring)
- 197 **Oral History and Interview Techniques (3)** Staff
Same as AmSt/Anth 197.
- 198 **Readings for the History Major (3)** Staff
Required of history majors; this course should be taken during the junior year. Readings and discussions on major trends in history; representative selections from the classics of historical literature. Students who receive credit for Hist 198 cannot receive credit for Hist 201. (Fall and spring)
- 199 **Senior Thesis (3)** Staff
Required of senior history majors. Normally to be taken after completing Hist 198. (Spring and fall)

HONORS

Director P. Rollberg

Assistant Professors H. Abugideiri, C. Betensky, K. Dougherty, W. Winstead

University Honors Advisory Committee

J. Kastle (*Chair*), L. Burke, D. Fuller, R. Goldfarb, L. Jacobson, A. Meltzer, B. Miller, N. Mikhalevsky, M. Moses, H. Nau, M. Pardavi-Horvath

The University Honors Program offers a program of enhanced study to undergraduates at The George Washington University. Incoming students may apply to the program when they apply for admission to the University. Current GW students may apply to the Honors Program Offices to join the program at the Foggy Bottom and Mount Vernon campuses.

Scholastic Requirements—All Honors Program students must take a number of Honors courses each semester and must maintain a cumulative GPA of 3.4 or higher. For each semester that an Honors student meets this requirement, his or her transcript will be marked "University Honors Program Scholar." Students who fail to maintain a cumulative GPA greater than 3.4 or fail to take an Honors course are considered probationary members and have their transcript marked "Member, University Honors Program." Students whose cumulative GPA falls to the level from which it is impossible to graduate with a cumulative GPA of 3.4 or higher are removed from the Program. Freshman students who fail to maintain a cumulative GPA of 3.0 are removed from the Program.

General Requirements—Freshman students must take Honr 15–16, the Honors first-year proseminar, and may take in addition any Honors course numbered below 100. Each student in the Honors Program must complete a senior thesis or research project. This project may be an Honors senior thesis; the course, seminar, or paper for departmental special honors; or one of the senior seminars offered by the Honors Program. Under appropriate conditions, the senior project may be done during the student's junior year.

Students may get Honors credit for internships or regular University courses by making arrangements through the Honors Program Offices. CCAS and ESIA students who wish to do this must have completed 60 credit hours of course work; SBPM and SEAS students must have completed 30 hours.

Honors Courses—The Honors Program offers a wide range of courses that varies from semester to semester, depending upon the availability of faculty and department resources. The Honors Program Offices provide a current list of courses offered. Honors courses numbered 100 and below are open to all Honors Program students and fulfill curriculum requirements in at least one of the schools. Courses numbered 105 to 179 are open to all sophomore, junior, and senior Honors Program students and other qualified students on a space-available basis. (Qualified students are those who meet the grade-point requirements that students in the Honors Program must maintain at that level.) Courses

numbered in the 180s are open to all junior and senior Honors Program students, and courses in the 190s are senior seminars.

When an Honors course covers the content of a departmental course, credit is not allowed for both. Please check with the Honors Program Offices for a list of course equivalents. In most instances applicable Honors courses may be substituted for program requirements; students should consult with their advisor to determine applicability.

A full description of the University Honors Program is provided in the Honors Program Handbook, available at the Honors Program Offices or through its website: <http://www.gwu.edu/~nhpwww/>. The Honors Program website also gives a list of current classes and activities of the Honors Program.

- 15-16 Honors Proseminar (3-3)** Staff
Required for first-year students in the Honors Program, but may be taken by others. The central texts and major ideas of Western civilization that form the fundamental bases of modern thought. Honr 15: Ancient origins of modern thought. Honr 16: Development of modern thought through recent times. (Academic year)
- 25 Honors Introduction to Logic (3)**
Methods of deductive and inductive logic with emphasis on sentential calculus. Argument analysis, recognition of fallacies, legal reasoning, and practical application of knowledge. (Fall and spring)
- 28 Honors Statistics (3)** Staff
Statistical reasoning as it relates to public policy, particularly medical, economic, and social policy. Emphasis on the philosophical basis of statistics. (Fall and spring)
- 33-34 Honors General Chemistry (4-4)**
An accelerated introductory chemistry course that includes special and advanced topics. Emphasis on laboratory research. Prerequisite: one year each of high school algebra with trigonometry and chemistry with laboratory. Laboratory fee, \$50 per semester. (Academic year)
- 36 Honors Geology (4)** Tollo
An introduction to the fundamental principles of geology and the geologic processes that shape and modify the planet. Field trips provide extensive first-hand research experience. (Fall, even years)
- 41 Honors Introduction to Sociology (3)** Wallace
An introduction to the field through the writings of the pioneer researchers, including Emile Durkheim, Max Weber, George Herbert Mead, and Karl Marx. (Fall)
- 42 Honors Sociocultural Anthropology (3)** Staff
An accelerated introduction to the study of cultures that emphasizes field research. (Fall)
- 43 Honors Microeconomics (3)** Goldfarb and Staff
An introductory microeconomics course that considers both the philosophical basis of economics as well as its methods and applications. (Fall)
- 44 Honors Macroeconomics (3)** Bradley and Staff
An accelerated introductory macroeconomics course that includes the study of special topics. (Spring)
- 45 Honors Introduction to Comparative Politics (3)**
Methods of finding similarities and differences across political systems related to the state, political culture, and other aspects. (Fall)
- 53 Honors Topics in Music (3)** Youens and Staff
Special topics of musicology studied with respect to its cultural and historical context. (Fall)
- 59 Honors Introduction to Acting (3)** Wade and Staff
Practical acting skills and the theory underlying method acting. Emphasis on the writings of Stanislavsky and his followers. (Fall and spring)
- 63-64 Honors English Literature (3-3)** T. Wallace, Soltan
A survey of English literature emphasizing modern theory-based criticism. Honr 63: From the Middle Ages to the Enlightenment; Honr 64: From the Enlightenment to the Modernist period. (Academic year)
- 81-82 Ancient Greek Language and Culture (4-4)** Fisher
An introductory-level study of classical Greek language and culture. Greek grammar, vocabulary, and reading together with readings in English about ancient Greek society and culture. (Academic year)

- 92 **Business Law: A Comparative International Approach** (3) Moersen
A comparative analysis of business law in the United States and other common law countries, as well as countries following other legal traditions. Emphasis on international transactions. (Spring)
- 105 **Honors Special Seminar** (1)
Expands upon skills gained in Honr 15-16 and applies them to philosophical questions or canonical text. (Fall and spring)
- 110 **Honors University Symposium** (1) Rollberg
An intensive two-day course that brings together a prominent speaker in a selected field and University faculty and students for lectures and discussion. (Fall and spring)
- 125 **Justice and the Legal System** (3) Kasle
An examination of justice from a legal and philosophical point of view. The course will be taught as a law class using the Socratic method. (Fall)
- 126 **Art, Censorship, and the First Amendment** (3) Kasle
An examination of the legal and social issues surrounding freedom of expression. The course is taught as a law class using the Socratic method. (Fall)
- 136 **Issues and Innovation in American Education** (3) Paley
An introductory course that explores various spheres in American educational thought and practice. Historical, psychological, sociological, and pedagogical standpoints are considered. (Spring)
- 170 **Special Topics in Literature and Theatre** (3) Staff
This course examines dramatic texts across historical periods and regional or national boundaries. (Spring)
- 175 **Honors Special Topics** (1 to 3) Staff
Topics are announced in the *Schedule of Classes* and the Honors Preregistration newsletter. (Fall and spring)
- 180 **Honors Course Conversion** (0)
Requires students to complete additional in-depth course work in a non-Honors course.
- 182 **Honors Internship** (1 to 3) Rollberg
Off-campus internship, usually in the student's major field. Includes regular assignments to put the work in a broader context. (Fall and spring)
- 184 **Honors Independent Study** (0 to 6) Rollberg
Independent study conducted in close cooperation with a faculty member.
- 196 **Honors ESIA Senior Seminar** (3) East
This course compares the ways nations conduct their foreign policies on various issues. Fulfills Honors senior thesis requirement. (Spring)
- 198 **Honors Thesis** (3) Rollberg
A one- or two-semester thesis under faculty guidance. May be repeated for credit. (Fall and spring)
- 199 **Senior Seminar** (3) Rollberg
Interdisciplinary approach to the Honors senior thesis requirement. Includes a weekly seminar to guide students through the senior thesis process. (Fall and spring)

HUMANITIES

Humanities Steering Committee

L. Youens (*Coordinator*), J. Chaves, R.P. Churchill, D. Khoury, J.-F. Thibault, M. Ticktin, D.D. Wallace, J.E. Ziolkowski

Columbian College of Arts and Sciences offers the courses listed here as an interdisciplinary approach to the study of the humanities. Hmn 1 through 5 and 11-12 are designed to provide a coherent introduction to Western culture. Hmn 6, 7, and 8 provide introductions to the cultures of Asia, Africa, and the Islamic world. With some variations among instructors, the courses deal with historical figures and events; creative works of art, literature, and music; and systems of philosophy and religious traditions.

- 1 **Roots of the Western Tradition** (3) Alcorn, Cook
Basic ideas of Western thought from early Greek, Roman, Judaic, and Christian traditions. Representative readings in drama, epic, historical writings, oratory, creation stories, scriptural traditions, philosophy, and spiritual autobiography. (Fall and spring)

2 Ideas in Western Culture: Aquinas to Locke (3)

Staff

An examination in historical context of central texts from the Middle Ages, the Renaissance, and the Enlightenment: Aquinas, Dante, Machiavelli, Erasmus, Luther, Montaigne, Bacon, Shakespeare, Rabelais, Descartes, Milton, and Locke. (Fall and spring)

3 The Enlightenment (3)

Ganz

Primary works representative of 18th-century European and American culture, examined from thematic and historical perspectives. Music, drama, poetry, the novel, art, architecture, economics, philosophy, and science are among the subjects included; 18th-century notions of Nature, reason, liberty, equality, natural law, and the question of human perfectibility. (Spring)

4 Romanticism and Revolution: The 19th Century (3)

Plotz

Major themes of 19th-century culture from 1789 to 1900 in representative works of European and American art, literature, music, drama, philosophy, and theology. The 19th-century resources of Washington—museums, monuments, collections, concerts, plays—form part of the curriculum. (Fall)

5 The 20th-Century Consciousness (3)

Gamber

Major themes and paradigms of 20th-century civilization as expressed in key literary and philosophic texts, visual arts, music, and cultural artifacts. Key issues include the meaning of history in the age of two world wars; the Holocaust and the crisis of reason; the authority of science; the decline of Western hegemony; modernism and postmodernism. (Spring)

6 Asian Humanities (3)

Chaves, Kim-Renaud

The traditional art and literature of the cultures of South Asia (India, Pakistan, Sri Lanka, Tibet) and East Asia (China, Korea, Japan). Attention to religious and philosophical systems as well as to continuities and changes in modern Asian culture. (Fall)

7 African Humanities (3)

Blyden

An introduction to the literature, art, and philosophy of the African continent in historical, cultural, and geographic contexts. Overview of sculpture, rock painting, and architecture; the oral tradition and modern literature; traditional philosophies and religions. The roles of Islam and Christianity in Africa. (Fall)

8 Islamic Humanities (3)

Khoury

Facets of Islamic civilization, including the defining features of the Islamic tradition and the history within which it has unfolded. The diversity within the Islamic community is considered, especially in its encounter with modernity. (Spring)

11-12 Roots of the Western Tradition (3-3)

Ticktin

A two-semester, in-depth expansion upon the content of Hmn 1. For students in the "Roots" Residential Program only. Hmn 12 is taken in conjunction with Engl 100. (Academic year)

INTERNATIONAL AFFAIRS

University Professor J.N. Rosenau

Professors G.M. Adams (*Practice*), C.J. Allen, H.G. Askari, M.A. Atkin, W.H. Becker,

E. Berkowitz, B.L. Boulter, M.D. Bradley, N.J. Brown, J. Chaves, J.J. Cordes, H.J. Davis,

C.J. Deering, R.M. Dunn, Jr., M.A. East, H.B. Feigenbaum, D. Gow (*Practice*), H. Harding,

J. Henig, G. Kaminsky, D.K. Kennedy, R.E. Kennedy, Jr., Y.K. Kim-Renaud, P.F. Klarén,

J. Kuipers, P. Lauter, J.M. Logsdon, G. Ludlow, J. Manheim, C. McClintock, J. Millar,

B.D. Miller, H.R. Nau, J. Pelzman, J.M. Post (*Practice*), P. Reddaway, B. Reich, W. Reich,

L.P. Ribuffo, R. Rodriguez-García, H.M. Sachar, D. Shambaugh, S.C. Smith, M. Sodaro,

R.H. Spector, R. Steinhardt, J.-F. Thibault, R. Thornton, S. Wolchik, A.M. Yezer

Associate Professors H.L. Agnew, D. Avant, A. Bowie, R.W. Click, B.J. Dickson, M.

Finnemore, J. Goldgeier, M. Gonglewski, D.A. Grier, R. Grinker, S. Hamano, J. Herschberg,

D. Khoury, J.H. Lebovic, D.L. Lee, S. Livingston, E.A. McCord, M.M. Mochizuki, M.O.

Moore, M. Price, J.A. Quiroga, S. Rehman, R. Robin, F. Robles, P. Rollberg, R.W. Rycroft,

S. Sell, S. Suranovic, H.J. Teegan, N.S. Vonortas, G.C.Y. Wang, W. Waters, R. Weiner,

H. Wolf

Assistant Professors H. Abugideiri, R.A. Carruth, E. Chako, D. Dassa Kaye, D. Fuller,

H.M. Harrison, K.W. Larsen, S. McHale, A. Prakash, J. Ryfa, J.M. Smith, M.B. Stein, J.H.

Williams, L. Willnat, D. Yang, A. Zimmerman

Adjunct Professors R. Butterworth, J. Hardt, J. Kilpatrick, S. Johnson, L. Kjonnerod (Practice), B. Powers (Practice), R. Sutter
Adjunct Associate Professor K. Thachuk
Adjunct Assistant Professors K. Lord, K. Healy

The Elliott School of International Affairs offers a multidisciplinary program leading to the degree of Bachelor of Arts in the field of international affairs. The program provides students with a broad background in the general areas of international affairs as well as a solid liberal arts education focusing on an understanding of major historical and contemporary issues in international affairs.

Bachelor of Arts with a major in international affairs—The following requirements must be fulfilled.

1. The general curriculum requirements stated under the Elliott School of International Affairs.

2. **Required courses for the major**—Econ 181–82; one course selected from Hist 137, 138, 182; one course selected from Hist 101, 136, 157, 183; one course selected from PSc 139, 140, 142, 144, 146, 149; one “global issues” course; and 6 credits of a modern foreign language at the third-year level of proficiency. Students must take a research methods course to be chosen from among Anth 117; Geog 105; PSc 101; Soc 101, 111, 112; Stat 51, 53, 105, 111, 112, 129.

3. **Concentration**—The Elliott School offers a large number of global issues and regional concentrations toward the major in international affairs. Each student chooses 15 credit hours of additional course work in one of the following concentrations. Global issues: international politics; international economics; comparative political, economic, and social systems; international development; contemporary cultures and societies; conflict and security; global public health; international environmental resources; international media and communications. Regional: Africa, Asia, Europe, and Eurasia, Latin America, Middle East. The Elliott School maintains lists of courses that may be applied toward each of these concentrations. In addition to the courses that appear on these lists, Topics courses and 700 Series courses may be included as part of the required 15 credit hours if approved by the advisor.

Special Honors—In addition to the general requirements stated under University Regulations, a candidate for Special Honors in international affairs must have attained a 3.4 grade-point average overall and complete either an Elliott School or Honors senior seminar, or an Honors senior thesis or a major independent study research project approved by the program director. Students must apply for honors candidacy prior to the beginning of the senior year.

The following courses carry the International Affairs (IAff) designation. All other courses listed above will be found under the appropriate department designation.

- 5 **Introduction to International Affairs: A Washington Perspective** (4) Staff
 A required course for Elliott School freshmen. IAff 5 covers the same academic content as PSc 3, while additionally integrating material designed to orient students to the University, the city of Washington, and the study of international affairs. Open only to first-year students in the Elliott School. (Fall and spring)
- 90 **Latin America: Problems and Promise** (3) Klarén, Price, Quiroga
 An interdisciplinary course in Latin American studies designed to introduce undergraduates to the diverse, rich, and complex history, politics, economy, culture, and society of Latin America. (Fall)
- 91 **East Asia—Past and Present** (3) McCord, McHale, Yang
 An interdisciplinary course offering a comprehensive and integrated introduction to the civilization and present problems of East Asia. (Spring)
- 92 **Russia and Eastern Europe: An Introduction** (3) Reddaway
 A multidisciplinary introduction to the lands and cultures of the former Soviet Union and Central and Eastern Europe. The main emphasis is on history and politics, with attention also given to economics, trade, geography, military matters, literature, and the media. (Fall)
- 93 **Africa: Problems and Prospects** (3) Staff
 Aspects of the environment, culture, and politics as they affect the present and anticipated future of Africa. (Spring)
- 190 **Special Topics** (3) Staff
 International affairs issues of a current or topical nature. Topics announced in the *Schedule of Classes*. May be repeated for credit.

- 195 Internship (0 to 3)** Staff
Internships in public, private, and nonprofit organizations concerned with international affairs. Admission by permission of instructor and Elliott School Office of Student Services.
- 198 Independent Study and Research (1 to 3)** Staff
For upper-division students only. Written permission of instructor required. May be repeated for credit with permission of the dean.

INTERNATIONAL BUSINESS

Professors G.P. Lauter, Y.S. Park, H.G. Askari, F. Robles, R. Weiner (Chair)

Associate Professors S.S. Rehman, J. Yang, H.J. Teegen, R.W. Click, J. Ferrer (Research)

Assistant Professors J.W. Spencer, P. Dastidar, L.A. Riddle, J.J. Forrer (Research)

See the School of Business and Public Management for programs of study leading to the degree of Bachelor of Business Administration.

- 160 Introduction to International Business (3)** Spencer, Dastidar, Riddle
The international business environment, including social, cultural, political, technological, and institutional domains. Multinational corporation strategic imperatives and organizational challenges, including financial, marketing, human resources, and other aspects of management. Prerequisite: Econ 11-12. (Fall and spring)
- 166 International Marketing Management (3)** Robles, Riddle
Scope of international markets; factors in assessing world marketing opportunities; international marketing product, pricing, distribution, and promotion program development in dynamic world markets and global environment. Prerequisite: BAdm 110. (Fall and spring)
- 168 Foreign Market Analysis (3)** Robles, Teegen
Project course involving global market research for target market selection, market entry strategy and in-country marketing plan development and financial implications of recommended global marketing strategy. Focus on consulting process as ancillary component. Prerequisite: IBus 160, 166.
- 171 International Business Finance (3)** Rehman, Yang, Click
Analysis of the international economic environment and its influence on corporate financial management of international operations. Prerequisite: BAdm 115. (Fall and spring)
- 173 International Banking (3)** Rehman, Schumacher
Theory and practice of international banking; analysis of international commercial and investment banking from a management perspective; subjects include current international monetary and financial environment, money and capital markets, and topical problems of international banking from a management perspective. Prerequisite: IBus 171.
- 175 International Monetary and Financial Issues (3)** Rehman, Yang, Dastidar
International macro and micro issues of money, banking, and finance examined from a management perspective. Topics include international monetary systems, Eurocurrency markets, LDC debt crises, role of the IMF and the World Bank, and development banking issues. Prerequisite: IBus 171 or permission of instructor.
- 190 Special Topics (3)** Staff
Experimental offering; new course topics and teaching methods.
- 199 Independent Study (arr.)**
Assigned topics. Admission by prior permission of advisor. May be repeated once for credit. (Fall and spring)

ITALIAN

See Romance Languages and Literatures.

JAPANESE

See East Asian Languages and Literatures.

JOURNALISM

See Media and Public Affairs.

JUDAIC STUDIES

Committee on Judaic Studies

M.E. Saperstein (*Director*), E. Cline, P. Duff, R. Eisen, Y. Moses, J.A. Plotz, B. Reich, W. Reich, H.M. Sachar, M. Ticktin

Columbian College of Arts and Sciences offers an interdisciplinary program in Judaic studies leading to the degree of Bachelor of Arts. This program is intended for students who wish to investigate the history, language, literature, religious and philosophical thought, and political and social experience of the Jewish people from the perspective of several academic disciplines. (Students who wish to concentrate on the religious aspects of Judaism and its relationship to the other religious traditions of the world may prefer to elect a major in religion with an emphasis on Judaism [see Religion].)

Bachelor of Arts with a major in Judaic studies—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Required courses for the major (43 credit hours):
 - (a) Hebr 1–2, 3–4; Hist 113 or 114 or 115; Hist 158; Rel 9 or Hist 108; Rel 106 or 107; PSc 176 or 179.
 - (b) Two courses in literature; may be in Hebrew, including Hebr 103, 104, 120–21, or in translation, including Clas 100, 101, 102.
 - (c) Two courses selected from the list below; substitutions are permitted with the approval of an advisor designated by the Committee on Judaic Studies.

Minor in Judaic studies—Required: Hebr 1–2 and a minimum of 12 credit hours, chosen in consultation with an advisor designated by the Committee on Judaic Studies, from the courses listed below. (Of the 12 credit hours, at least 6 must be taken at GW and at least 6 must be in courses other than Hebrew language study.)

Students who have studied abroad should verify the residence requirements of Columbian College of Arts and Sciences.

Anth 188	<i>Archaeology of Israel and Neighboring Lands</i>
Clas 100	<i>Modern Hebrew Literary Classics</i>
Clas 101	<i>Israeli Society and Culture: Literary Perspectives</i>
Clas 102	<i>Contemporary Israeli Short Stories and Poetry</i>
Clas 185–86	<i>Directed Reading</i>
Engl 188	<i>Jewish American Writing</i>
Hebr 1–2	<i>Beginning Hebrew</i>
Hebr 3–4	<i>Intermediate Hebrew</i>
Hebr 103	<i>Modern Hebrew Nonfiction</i>
Hebr 104	<i>Modern Hebrew Fiction</i>
Hebr 106	<i>The Israeli Media</i>
Hebr 120–21	<i>Advanced Hebrew Literature</i>
Ydsh 1–2	<i>Yiddish for Reading and Conversation</i>
Hist 108	<i>History of Ancient Israel</i>
Hist 113	<i>History of the Jews in Christian Europe to the 18th Century</i>
Hist 114	<i>History of the Jews in Islamic Lands</i>
Hist 115	<i>Messianic Movements and Ideas in Jewish History</i>
Hist 158	<i>Modern Jewish History</i>
Hist 159	<i>The Holocaust</i>
Hist 161	<i>Jewish Historical Writing</i>
Hist 292	<i>Israel, Zionism, and the Arab World</i>
PSc 176	<i>The Arab-Israeli Conflict</i>
PSc 179	<i>Israeli Politics and Foreign Policy</i>
Rel 9	<i>Bible: Hebrew Scriptures</i>
Rel 103	<i>The Prophets</i>
Rel 106	<i>Judaism</i>
Rel 107	<i>Rabbinic Thought and Literature</i>
Rel 112	<i>Jewish Mysticism</i>
Rel 113	<i>Early Post-Biblical Judaism</i>
Rel 115	<i>Jewish Philosophy in the Medieval Period</i>
Rel 116	<i>Modern Jewish Thought</i>
Rel 123	<i>Issues in Jewish Ethics</i>

- Rel 134 *The Holocaust in Theology and Literature*
 Rel 174 *American Judaism*

KOREAN

See **East Asian Languages and Literatures.**

LATIN

See **Classical and Semitic Languages and Literatures.**

LATIN AMERICAN STUDIES

Program Committee: J. Ferrer (*Director*), C.J. Allen, A. Balkansky, P.F. Klarén, C. McClintock, M. Price, J. Quiroga

The Elliott School of International Affairs offers a multidisciplinary program leading to a Bachelor of Arts with a major in Latin American studies.

Bachelor of Arts with a major in Latin American studies—The following requirements must be fulfilled.

1. The general curriculum requirements stated under the Elliott School of International Affairs.
2. Required courses for the major—IAff 90; Hist 162, 163, 164, 165; Econ 185; PSc 183, 184; Geog 161; any one of Anth 170, 172, 186; one course in Spanish-American literature chosen from Span 55, 56, or 133–34.
3. Six credit hours of related course work must be taken in anthropology, art history, economics, geography and regional science, history, international affairs, political science, and/or Hispanic literature.
4. Completion of third-year-level language study in Spanish (Span 10) or another approved foreign language.

Special Honors—In addition to the general requirements stated under University Regulations, a candidate for Special Honors in Latin American studies must have attained a 3.4 grade-point average overall and complete either an Elliott School or Honors senior seminar, or an Honors senior thesis or a major independent study research project approved by the program director. Students must apply for honors candidacy prior to the beginning of the senior year.

Students should consult the program guidelines available from the Elliott School for courses pertinent to Latin American studies. Students should consult the program director concerning certain Special Topics or Selected Topics courses that may also be part of this program.

LIBERAL ARTS

Advisor H. Yeide

Bachelor of Arts: Program in the Liberal Arts—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. *Writing*—6 credit hours from Engl 9 or 10, 11, 14–15, 100, 101, 111, and/or creative writing courses.
3. *Quantitative and Logical Reasoning*—6 credit hours (see Category 2 under Columbian College of Arts and Sciences General Curriculum Requirements).
4. *Natural Sciences*—12 credit hours selected from two of the following fields: biology (including biological anthropology), chemistry, geology, and physics (including astronomy).
5. *Social and Behavioral Sciences*—12 credit hours: (a) 6 hours selected from anthropology (except biological anthropology), geography, psychology, and/or sociology; and (b) either 6 hours of economics or 6 hours of political science.
6. *The Arts*—3 credit hours selected from fine arts, creative writing, dance performance, electronic media performance, applied music (jazz performance, a single instrument, or a single ensemble), and theatre performance. A creative writing course may count for either this requirement or the Writing requirement but not both.
7. *Literature*—12 credit hours of which 6 hours are a survey or sequence in English literature (e.g., Engl 51–52, 71–72, 73–74, 91–92, 127–28) and 6 hours are selected from

literature courses (in either a natural language or translation) offered by the Departments of Classical and Semitic Languages and Literatures, East Asian Languages and Literatures, Religion, Romance Languages and Literatures, and German and Slavic Language and Literatures, or offered through the Honors program. Some courses may count for either this requirement or the Humanities requirement but not both.

8. *Humanities*—15 credit hours: (a) 6 hours selected from American studies, history, and/or women's studies; (b) 6 hours selected from classics, humanities, philosophy, religion, or honors (with approval of the advisor); (c) 3 hours selected from art history, music (Mus 7, 8, 101–2, 103–4), or theatre and dance (TrDa 45, 46, 145–46).

9. *Foreign Language*—8 credit hours beyond the second-year sequence.

10. A minimum of 36 credit hours must be taken in approved 100-level liberal arts courses (with a grade of C– or better).

Special Honors—In addition to the general requirements stated under University Regulations, in order to be considered for graduation with special honors, a student must maintain a cumulative 3.5 grade-point average in all courses taken at GW and earn an A in at least six of the 12 required 100-level liberal arts courses.

Because this program allows considerable flexibility, a student should consult the advisor frequently to ensure that requirements are being addressed and that the planned program best meets the student's evolving interests and needs. The major in Liberal Arts may be combined with a second major. See Interdisciplinary Programs under Columbian College of Arts and Sciences for a general description of this program.

LINGUISTICS

Committee on Linguistics

B. Tyndall (*Chair*), L. Bland, G.R. Bozzini, J.K. Donaldson, S. Hamano, Y.-K. Kim-Renaud, J. Kuipers, R.M. Robin, G. Song

Columbian College of Arts and Sciences offers an interdepartmental program in linguistics. The purpose of the program is to provide a systematic treatment of the central issues in linguistics through courses taught under the auspices of the program and through other departments in Columbian College.

Minor in linguistics—15 credit hours of courses in linguistics, including Ling 101 and four courses from the following groups. Psycholinguistics—Ling 102. Applied Linguistics—Chin 123–24; SpHr 130, 131. Biological Foundations of Language—SpHr 102, 103. Sociolinguistics—Anth 161, 162; Phil 214 (with permission of instructor). Academic advising about the minor in linguistics is available from any member of the Committee on Linguistics.

101 **Language and Linguistic Analysis** (3) Tyndall and Staff
Development of a fundamental understanding of the nature of language and its components, including phonology, morphology, syntax, semantics, and pragmatics. Discussion of major approaches, principles, and concerns in the field of linguistics. Same as Anth 168. (Spring)

102 **Psycholinguistics** (3) Tyndall and Staff
Language as species-specific property of the human mind. Psychological processes involved in the encoding and decoding of language; first and second language acquisition and bilingualism. Same as Anth 163. (Spring)

MANAGEMENT SCIENCE

Professors J.B. Harvey, W.E. Halal, E.H. Forman, S.A. Umpleby, J.F. Lobuts, Jr., E.K. Winslow (*Chair*), J.H. Carson, P.W. Wirtz, E.J. Cherian, J.H. Perry, P.K. Bagchi, J.P. Coyne, R. Soyer, M.J. Granger, E. Jaques (*Research*)

Associate Professors T.J. Nagy, R.G. Donnelly, P.M. Swiercz, D.J. Cohen, D.L. Zalkind, W.H. Money, J. Artz, L. Williams, S.Y. Prasad, J. Bailey, M.M. Tarimcilar, E.G. Caravannis, P. McHugh, S. Kanungo

Assistant Professors C. Goldberg, J. Feinstein, F.T. Anbari, D.F. Cioffi, S. Dasgupta, Y.H. Kwak, R.A. Lumley, T.H. Rosen, S. Serich, P. Weiss, J.F. Sencindiver, M.C. Aniebonam, M.M. Hammad, V. Owei

Instructors E. Hahn, N. McGarry

Adjunct Associate Professors C.K. Carlson, C.N. Toftoy

Professorial Lecturers E. Marits, C.T. Solomon, J.L. Wild, D. Harris, D. Karlgaard
Associate Professorial Lecturers C.A. Gruel, J. Barker, J. Abramson, C.O. Bevis

See the School of Business and Public Management for programs of study leading to the degree of Bachelor of Business Administration.

- 107 **Fundamentals of Behavioral Science** (3) Lobuts, Winslow, Bailey
 Survey of behavioral science research and practice as related to management. Emphasis on the basic human processes that contribute to the functioning of organizations. (Fall and spring)
- 110 **Applied Human Resource Management** (3) Cohen, McHugh, Swiercz
 The labor force and labor markets. The legal environment of human resource management. Human resource planning; employee recruiting, selection, training, development, compensation, motivation, discipline, health and safety. Prerequisite: BAdm 130.
- 115 **Leadership** (3) Malone, Cohen
 Examination of theories and contemporary trends relating to leadership, organizational behavior, and the management of human resources. Experiential exercises designed to enhance interpersonal skills and leadership abilities. Prerequisite: BAdm 130 (Fall)
- 116 **Advanced Topics in HRM** (3) Cohen, Goldberg, McHugh, Swiercz
 Advanced examination of contemporary practices in human resource management, including recruitment and selection, training and development, performance appraisal, compensation and benefits, and employee relations. Student interaction with practitioners through field experiences, case analyses, and experiential exercises. Prerequisite: BAdm 130 or permission of instructor. (Fall)
- 117 **Labor Relations, Negotiation, and Conflict Resolution** (3) McHugh
 Introduction to labor-management relations. Labor law; economic, social, and public policy implications of collective bargaining; negotiation and conflict resolution in union and non-union workplaces. Prerequisite: BAdm 130. (Spring)
- 119 **Introduction to Structured Programming** (3) Granger
 For students already familiar with basic computer concepts, who will learn a programming language, such as C, Pascal, or Visual Basic, useful for business applications. Emphasis on computer applications in accounting and management information systems through hands-on programming. Prerequisite: BAdm 54 or 64. (Fall and spring)
- 120 **Structured Development with CASE** (3) Dasgupta, Granger
 Analysis, design, and implementation of management information systems (MIS). Structured methodologies and techniques for various stages of the MIS development process. Computer-aided software engineering tools. May be taken for graduate credit with permission of program director and instructor. Prerequisite: Mgt 119 or permission of instructor. (Fall and spring)
- 121 **Database Design and Applications** (3) Granger, Dasgupta
 Theory, architecture, and implementation of database management systems in corporate and organization information systems. Fundamental concepts of database management and processing. Expert database systems. Hands-on experience with database management packages. Prerequisite: Mgt 119 or permission of instructor. (Fall and spring)
- 123 **Business Data Communications** (3) Prasad, Dasgupta
 A technical overview of data communication concepts that are useful in the design and management of local and wide area networks. Internet technologies and their business applications are emphasized. Prerequisite: BAdm 54 or 64. (Spring)
- 190 **Special Topics** (3) Staff
 Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 192 **Small-Business Management** (3) Toftoy
 Theory and practice of small-business management. Focus on effective management of small firms, essentials of planning and organizing the firm, financial and administrative controls. Evaluation of alternative business forms: purchase of an ongoing firm, franchising, and new business start-ups. (Fall and spring)

- 193 **New Venture Tactical Planning** (3) Toftoy, Carayannis
Development of a comprehensive business plan based on a feasibility study.
Prerequisite: Mgt 192. (Fall)
- 194 **Product Development and Venturing** (3) Toftoy, Carayannis
Students form entrepreneur teams to develop new products. Prerequisite: Mgt 192 or permission of instructor. (Spring)
- 199 **Independent Study** (3) Staff
Assigned topics. Admission by prior permission of advisor. May be repeated once for credit. (Fall, spring, and summer)

MARKETING

Professors S.F. Divita (*Chair*), R.F. Dyer, P.A. Rau, R.S. Achrol, L.M. Maddox
Associate Professors M.L. Liebrezn-Himes, S.S. Hassan
Assistant Professor A.K. Smith

See the School of Business and Public Management for programs of study leading to the degree of Bachelor of Business Administration.

Departmental prerequisite: BAdm 110 is prerequisite to all courses in the Marketing Department.

- 142 **Consumer Behavior** (3) Hassan and Staff
Social, cultural, and psychological factors influencing the behavior of consumers. Models of buyer behavior, consumption patterns, market segmentation, attitude formation and change, brand loyalty, adoption of innovations, and store choice decisions. Marketing management and public policy implications of consumer research. (Fall and spring)
- 143 **Marketing Research** (3) Rau and Staff
Basic methods and techniques of market research. Designing a marketing research project: research questions, secondary and syndicated data, primary data collection approaches, data analysis and report presentation. Focus group interviews, questionnaire construction, statistical software packages. Prerequisite: BAdm 54, Stat 51. (Fall and spring)
- 148 **Advertising** (3) Maddox
Planning an advertising campaign. Consumer and market information, message appeals, media selection and scheduling, measuring effectiveness. Current criticism and regulation of the advertising function. Other major marketing communication tools, including personal selling and sales promotion. Prerequisite: Mktg 142. (Fall)
- 149 **Advanced Advertising Campaigns** (3) Maddox
Participation in the National Student Advertising Competition. Research, media planning, copywriting, layout/design. Travel to competition site. Prerequisite: BAdm 110 and permission of instructor; corequisite: Mktg 199. (Spring)
- 150 **Salesmanship and Sales Management** (3) Staff
Development of personal selling and presentation skills; examination of types of selling situations. Organization of sales department, sales planning and forecasting, quotas, territories, performance standards, and analysis and control of distribution costs. (Fall and spring)
- 152 **Retailing Management** (3) Staff
A study of retailing management and strategy covering the current environment of retailing, retail market and financial analysis, store location and design, inventory management, and non-store and service retailing. Industry executive and student presentations and case analyses. (Fall)
- 159 **Marketing: Strategic Planning** (3) Dyer, Liebrezn-Himes, Rau, Jacobina
The capstone seminar for marketing majors. Analytical integration of material covered in previous marketing courses. Marketing strategy literature, financial dimensions of marketing decisions, and comprehensive cases. Prerequisite: Mktg 142, 143, 150, and one additional marketing major field course. (Fall and spring)
- 190 **Special Topics** (3) Staff
Experimental offering: new course topics and teaching methods.
- 199 **Independent Study** (arr.)
Assigned topics. Admission by prior permission of advisor. May be repeated once for credit. (Fall and spring)

MATHEMATICS

Professors I. Katz, H.D. Junghenn, L.L. Glick, M.M. Gupta, E.A. Robinson, F.E. Baginski, D.H. Ullman (*Chair*), J. Przytycki

Associate Professors V. Harizanov, K.G. Hockett, M. Moses, J. Bonin, Y. Rong, W. Schmitt

Assistant Professors D. Ivansic, L. Abrams, S. Faridi, L. Kalikow

Bachelor of Arts with a major in mathematics—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses—Math 21 or 31, and Math 32 and 33.
3. Required courses in the major—a minimum of 27 additional credit hours of approved 100-level courses in mathematics, including Math 121, 124, 139, 140, and either Math 122 or 125.

Bachelor of Science with a major in applied mathematics—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite courses—Math 21 or 31, and Math 32 and 33.
3. Required courses in the major—a minimum of 27 additional credit hours of approved 100-level courses in mathematics, including Math 124, 139, 142, 143, and either Math 153 or 157.
4. Required courses in a related area—12 additional credit hours, to be selected in consultation with a departmental advisor, from a related area such as statistics, computer science, physics, engineering, chemistry, biology, economics, or applied science. At least 6 of these hours must be chosen from courses at the 100 level or higher.

Special Honors—To graduate with Special Honors, a student must meet the general requirements stated under *University Regulations*; maintain a grade-point average of at least 3.5 in mathematics courses; enroll in 3 credit hours of Math 195 in addition to the 24 credit hours of required courses in the major; and present an oral defense of a senior thesis prepared for Math 195.

Minor in mathematics—18 hours in mathematics courses, of which at least 12 are at the 100 level or higher, chosen in consultation with a departmental advisor.

With permission, graduate courses in the department may be taken for credit toward an undergraduate degree. See the *Graduate Programs Bulletin* for course listings.

Note: Math 21, 31, and 52 are related in their subject matter, and credit for only one of the three may be applied toward a degree. Some courses require a placement examination in lieu of a course prerequisite. This examination is offered by arrangement with the Department of Mathematics.

3 College Algebra (3) Staff
Equations and inequalities, functions and graphs, polynomial and rational functions, exponential and logarithmic functions, systems of equations. Prerequisite: the placement examination.

6 Trigonometry (3) Staff
Right triangles, trigonometric functions and their graphs. Trigonometric identities. Polar coordinates. Prerequisite: Math 3 or the placement examination. (Offered via distance education only)

9 Mathematical Ideas I (3) Staff
Prime numbers, the fundamental theorem of arithmetic, rational and irrational numbers. Infinite sets and cardinal numbers.

10 Mathematical Ideas II (3) Staff
Axiom systems, probability, elementary graph theory, map coloring, Euler's formula.

20–21 Calculus with Precalculus I–II (3–3) Staff
An introduction to single-variable calculus (differentiation and integration of algebraic and trigonometric functions with applications), with the concepts and techniques of precalculus developed as needed. Prerequisite to Math 20: Math 3 or the placement examination or a score of 560 or above on the SAT II in mathematics; Math 20 is prerequisite to Math 21.

30 Precalculus (3) Staff
Equations, inequalities, and functions. Properties of polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: the placement examina-

- tion or a score of 560 or above on the SAT II in mathematics. (Offered via distance education only)
- 31 **Single-Variable Calculus I** (3) Staff
Limits and continuity. Differentiation and integration of algebraic and trigonometric functions with applications. Prerequisite: Math 6 or 30 or the placement examination or a score of 720 or above on the SAT II in mathematics.
- 32 **Single-Variable Calculus II** (3) Staff
The calculus of exponential and logarithmic functions. L'Hopital's rule. Techniques of integration. Infinite series and Taylor series. Polar coordinates. Prerequisite: Math 21 or 31.
- 33 **Multivariable Calculus** (3) Staff
Partial derivatives and multiple integrals. Vector-valued functions. Topics in vector calculus, including line and surface integrals and the theorems of Gauss, Green, and Stokes. Prerequisite: Math 32.
- 51 **Finite Mathematics for the Social and Management Sciences** (3) Staff
Systems of linear equations, matrix algebra, linear programming, probability theory, and mathematics of finance. Prerequisite: Math 3 or the placement examination or a score of 560 or above on the SAT II in mathematics.
- 52 **Calculus for the Social and Management Sciences** (3) Staff
Differential and integral calculus of functions of one variable; applications to business and economics. Prerequisite: Math 3 or the placement examination or a score of 560 or above on the SAT II in mathematics.
- 91 **Introductory Special Topics** (1 to 3) Staff
Admission by permission of instructor. May be repeated for credit.
- 101 **Introduction to Mathematical Logic** (3) Harizanov, Moses
Symbolic logic as a precise formalization of deductive thought. Logical correctness of reasoning. Formal languages, interpretations, and truth. Propositional logic and first-order quantifier logic suited to deductions encountered in mathematics. Prerequisite: Math 32 or permission of instructor.
- 102 **Axiomatic Set Theory** (3) Harizanov, Moses
Cantor's theory of sets. Russell's paradox. Axiomatization of set theory as a framework for a contradiction-free mathematics. Finite, countable, and uncountable sets; ordinal and cardinal numbers; the axiom of choice. Prerequisite: Math 32 or permission of instructor.
- 103 **Computability Theory** (3) Harizanov, Moses
The unlimited register machine as a model of an idealized computer. Computable functions, Church's thesis. Effective enumerability. Unsolvability of the halting problem and other theoretical limitations on what computers can do. Prerequisite: Math 32 or permission of instructor.
- 106 **Introduction to Topology** (3) Przytycki, Rong
Metric spaces: completeness, compactness, continuity. Topological spaces: continuity, bases, subbases, separation axioms, compactness, local compactness, connectedness, product and quotient spaces. Prerequisite: Math 139 or permission of instructor.
- 113 **Introduction to Combinatorics** (3) Bonin, Ullman, Schmitt
Introduction to combinatorial enumeration and partially ordered sets. Basic counting techniques, inclusion-exclusion principle, recurrence relations, generating functions, pigeonhole principle, bijective correspondences, and applications to computer science, optimization, and coding theory. Prerequisite: Math 32.
- 120 **Elementary Number Theory** (3) Bonin, Katz
Divisibility of integers, prime numbers, greatest common divisor, the Euclidean algorithm, congruence, the Chinese remainder theorem, number theoretic functions, Möbius inversion, Euler's phi function, primitive roots and indices, and applications to cryptography and primality testing. Prerequisite: the placement examination.
- 121 **Introduction to Abstract Algebra** (3) Abrams, Katz, Faridi
Study of groups and associated concepts, including Lagrange's theorem, Cayley's theorem, the fundamental theorem of homomorphisms, and applications to counting. Prerequisite: Math 32 and 124 or permission of instructor.
- 122 **Introduction to Abstract Algebra II** (3) Abrams, Katz, Faridi
Study of rings, through maximal and prime ideals, and the study of fields, through Galois theory. Prerequisite: Math 121.

- 124 Introduction to Matrix Theory (3)** Staff
Linear equations, matrices, inverses, and determinants. Vector spaces, rank, eigenvalues, and diagonalization. Applications to geometry and ordinary differential equations. Prerequisite: Math 21 or 31, or 51 and 52, or permission of instructor.
- 125 Linear Algebra (3)** Abrams, Katz, Faridi
Theory of vector spaces, linear transformations, and matrices. Quadratic and bilinear forms, spectral decomposition, similarity. Prerequisite: Math 124.
- 132 Introduction to Graph Theory (3)** Bonin, Ullman
Fundamental concepts, techniques, and results of graph theory, including applications to operations research, computer science, chemistry, and the social sciences. Topics include trees, connectivity, traversability, matchings, coverings, colorability, planarity, networks, and Polya enumeration. Prerequisite: Math 21 or 31.
- 135 Projective Geometry (3)** Bonin, Katz
Projective spaces, projectivities, conics, pairs and pencils of conics, finite planes, coordinates, collineation, Desarguesian planes. Prerequisite: Math 120 or 121 or permission of the instructor.
- 139 Advanced Calculus I (3)** Hockett, Junghenn, Ullman
A rigorous study of differentiation, integration, and convergence. Topics include sequences and series, continuity and differentiability of real-valued functions of a real variable, the Riemann integral, sequences of functions, and power series. Prerequisite: Math 33.
- 140 Advanced Calculus II (3)** Hockett, Junghenn, Ullman
Continuation of Math 139. Topics include: topology of \mathbb{R}^n , derivatives of functions of several variables, inverse and implicit function theorems, multiple integrals, generalized Stokes's theorem. Prerequisite: Math 124 and 139.
- 142 Ordinary Differential Equations (3)** Hockett, Robinson
A first course in ordinary differential equations with an emphasis on mathematical modeling: solution curves, direction fields, existence and uniqueness, approximate solutions, first and second order linear equations, linear systems, phase portraits, and Laplace transforms. Prerequisite: Math 33 and 124 or permission of instructor.
- 143 Partial Differential Equations (3)** Baginski, Gupta
A first course in partial differential equations: Fourier series and separation of variables, vibrations of a string, Sturm-Liouville problems, series solutions, Bessel's equation, linear partial differential equations, wave and heat equations, separation of variables. Prerequisite: Math 33 and 124 or permission of instructor.
- 148 Differential Geometry (3)** Baginski, Robinson
Curves in space, regular surfaces, tensors, fundamental forms of a surface, Gauss-Bonnet theory, minimal surfaces. The geometry of the Gauss map. Prerequisite: Math 140 or permission of instructor.
- 153 Introduction to Numerical Analysis (3)** Gupta
Accuracy and precision. Linear systems and matrices. Direct and iterative methods for solution of linear equations. Sparse matrices. Solution of nonlinear equations. Interpolation and approximate representation of functions, splines. Prerequisite: Math 33 or 124 and some knowledge of computer programming.
- 157 Introduction to Complex Variables (3)** Junghenn
Analytic functions and power series. Contour integration and the calculus of residues. Conformal mapping. Physical applications. Prerequisite: Math 139 or permission of instructor.
- 170 Computational Complexity (3)** Harizanov, Moses
Deterministic and nondeterministic Turing machines. Partial recursive functions and the Church-Turing thesis. Undecidable problems. Space and time complexity measures. Gap, speed-up, and union theorems. Decidable but intractable problems. The traveling salesman problem and other NP-complete problems. Prerequisite: Math 32 or permission of instructor.
- 181 Seminar: Topics in Mathematics (3)** Staff
Each offering of this course focuses on a particular aspect of mathematics. Past topics have included computational mathematics, fractals; network flows and combinatorial optimization; information theory and coding theory; dynamical

systems: queuing theory. May be repeated for credit with permission. Prerequisite: Math 124 and 139 or permission of instructor.

191 Special Topics (arr.)

Admission by permission of instructor. May be repeated for credit.

195 Reading and Research (arr.)

Under the personal direction of an instructor. Limited to mathematics and applied mathematics majors with demonstrated capability. Prior approval of instructor required. May be repeated for credit.

MECHANICAL AND AEROSPACE ENGINEERING

Professors H. Liebowitz, M.K. Myers (*Chair*), R.E. Kaufman, C.M. Gilmore, J.L. Whitesides, D.L. Jones, C.A. Garriss, J.D.-Y. Lee, R.H. Tolson, R. Sandusky, T. Tong, I.H. Shames (*Visiting*), P.A. Cooper (*Research*)

Associate Professors C. Mavriplis, Y.-L. Shen, A.D. Cutler

Assistant Professor R. Mittal

Adjunct Professors B.W. Hannah, P. Matic

Professorial Lecturers J.A. Sprague, C.R. Hauer, S.M. Joshi, J. Juang, I. Raju, J.W. Edwards, G.C. Everstine, A.R. Johnson, J. Sobieski

Associate Professorial Lecturers T.K. O'Brien, A. Auslander, J.K. Soldner

See the School of Engineering and Applied Science for the programs of study leading to the Bachelor of Science (Mechanical Engineering).

1-2 Introduction to Mechanical and Aerospace Engineering (1-1) JStaff

Introduction to careers in mechanical and aerospace engineering and the necessary educational program. Development of teamworking and problem-solving skills for solution of mechanical and aerospace design problems. Experience with both analytical and design problems and correlations between academic skills and the mechanical and aerospace engineering professions. Participation in national and regional student competition (Academic year)

4 Engineering Drawing and Computer Graphics (3) Jones, Shen, and Staff

Introduction to technical drawing, including use of instruments, lettering, geometric construction, sketching, orthographic projection, section and auxiliary views, dimensioning, pictorial drawing, and intersections and developments. Introduction to computer graphics, including topics covered in manual drawing, and computer-aided drafting. (Fall and spring)

117 Engineering Computations (3) Mavriplis and Staff

Numerical methods for engineering applications. Methods for solving systems of linear equations, root finding, curve fitting, and data approximation. Numerical differentiation and integration and numerical solution of differential equations. Computer applications. Prerequisite: CSci 49 or 50. (Spring)

120 Methods of Engineering Experimentation (2) Jones and Staff

Acquisition and analysis of experimental data. Laws of modeling and simulation. Report formulation and presentation. Basic principles of measuring instruments and sensors. Fundamentals of digital data acquisition and use of computer-based data systems. Strain gages, oscilloscopes, transducers, and computerized data systems. Prerequisite: MAE 117. (Spring)

126 Fluid Mechanics (3) Garriss, Mavriplis, Shames

Fluid properties, fluid statics, integral and differential formulations of conservation of mass, momentum, and energy. Bernoulli's equation. Dimensional analysis and similitude. Inviscid flow. Viscous flow. Experimental and computational methods in fluid mechanics. Prerequisite: ApSc 58. (Fall)

131 Thermodynamics (3) Staff

Fundamentals of equilibrium thermodynamics; Zeroth, First, and Second Laws. Work, heat, internal energy, enthalpy, thermodynamic potential functions; heat transfer mechanisms, phase diagrams, equations of state and property tables, power systems, refrigeration, heat pump systems. Reversible and irreversible processes, Carnot cycle, entropy, exergy. Prerequisite: Phys 21. (Spring)

134 Introduction to Vibration Analysis (3) Garriss, Lee

Natural frequencies, free vibration, forced vibration. Unbalance, whirling, vibration isolation. Measuring techniques and application of computers in vibration analysis. Multiple degrees of freedom. Dynamic vibration absorbers. Shock and transient vibration. Prerequisite: ApSc 58. (Spring)

- 145 Orbital Mechanics and Spacecraft Dynamics (3)** Tolson
Coordinate systems and transformations, rocket equation, two-body problem, orbit transfers, orbit perturbations, attitude dynamics and stability of symmetric spacecraft, environmental and control torques. (Fall)
- 149 Thermal Systems Design (3)** Staff
Completion of a thermal systems design project that requires integration of engineering science, economics, reliability, safety, ethics, professional responsibility, and social considerations. Development and use of design methodology, optimization, feasibility considerations, detailed system descriptions, and presentation of results. Prerequisite: MAE 187. (Fall)
- 152 Mechanical Engineering Laboratory (2)** Garriss and Staff
Project-oriented course. Simulates working environment of professional engineers. Projects are assigned in student's areas of interest; student is expected to design and assemble own experiments. Extensive use of instrumentation and computing facilities. Project proposal, progress reports, final report, and periodic oral presentations required. Prerequisite: MAE 120. (Spring)
- 155 Aerodynamics (3)** Myers, Garriss
Subsonic and supersonic aerodynamics: potential flow, lift and form drag, viscous effects, compressible flow. Prerequisite: MAE 126. (Spring)
- 157 Aerodynamics Laboratory (1)** Staff
Subsonic and supersonic wind tunnel experiments and simulations. (Fall)
- 162 Aerospace Structures (3)** Staff
Basic structural theory of lightweight aerospace structures. Development of shear and bending moment diagrams and stresses. Analysis of typical mono-coque structures. External airloads and their distribution. Mechanical properties of metal and advanced composite structures. Design of members in tension, bending or torsion, and design of webs in shear. (Spring)
- 163 Airplane Performance (3)** Staff
Lift and drag estimation methods. Airplane performance measures, such as range and endurance, turning flight, specific excess power and acceleration, takeoff and landing performance. Longitudinal and lateral-direction static and dynamic stability. Control surface effectiveness. (Fall)
- 166 Materials Engineering (2)** Gilmore, Haque
Mechanical properties, plastic deformation dislocation theory, yielding, strengthening mechanisms, microstructure and properties, heat treatment of steel, composites, amorphous materials, viscoelastic deformation, creep, fracture, fatigue, fatigue crack propagation. Prerequisite: ApSc 130; concurrent registration: CE 120. Same as CE 166. (Fall)
- 167 Mechanics of Materials Laboratory (1)** Gilmore, Haque
Measurement of strains and study of failure resulting from applied forces in ductile, brittle, anisotropic, elastomeric, plastic, and composite materials. Study of tension, compression, bending, impact, and shear failures. Prerequisite or concurrent registration: MAE 166. Same as CE 167. (Fall)
- 182 Electromechanical Control System Design (3)** Lee
Application of control theory to the design of electromechanical systems. Transducers, valves, and other control components. Mathematical models of open- and closed-loop electromechanical systems. Root locus and frequency response methods: application to the synthesis of feedback systems by both manual and computer-aided techniques. Prerequisite: ApSc 114; MAE 117, 134. (Fall)
- 187 Heat Transfer (3)** Staff
Steady- and unsteady-state heat conduction problems. Analytical and numerical solution methods. Convective heat transfer, boundary-layer approach, analogy between heat and momentum transfer. Thermal radiation; fundamental concepts and laws. Heat-exchanger design. Prerequisite: MAE 126, 131. (Spring)
- 190 Analysis and Synthesis of Mechanisms (3)** Kaufman and Staff
Kinematics and dynamics of mechanisms. Displacements, velocities, and accelerations in linkage, cam, and gear systems by analytical, graphical, and computer methods. Synthesis of linkages to meet prescribed performance requirements. Prerequisite: ApSc 58. (Fall)
- 191 Mechanical Design (3)** Kaufman and Staff
Integration of knowledge of strength of materials in a design context. Stresses and deflections in engineering structures. Theories of failure. Introduction to the design of mechanical components, such as fasteners, shafts, springs. Intro-

- duction to the use of computers in mechanical engineering design. Prerequisite: CE 120, MAE 117. (Spring)
- 192 **Manufacturing Processes and Systems** (3) Shen and Staff
Introduction to manufacturing techniques for metals, polymers, ceramics, and composites. Relationships between properties of materials and techniques for processing them. Process selection, design, control, and integration. Computer-integrated manufacturing, robotics and assembly automation. Prerequisite: junior status or permission of instructor. (Fall)
- 193 **Engineering Systems Design** (3) Kaufman and Staff
Creative engineering design, problem definition, and concept generation. Design of journal and roller element bearings, fasteners and permanent joints, and springs. Design project incorporating design selection, and optimization. Project presentation using graphical and computer resources. Prerequisite: MAE 191. (Fall)
- 195 **Computer-Aided Engineering of Mechanical Systems** (3) Jones and Staff
Presentation of the major elements of computer-aided engineering systems: interactive computer graphics, finite element analysis, and design optimization. Consideration of economics, safety, and reliability factors. Prerequisite: MAE 193; concurrent registration: MAE 196. (Spring)
- 196 **Computer-Aided Engineering Laboratory** (1) Jones and Staff
Instruction and hands-on applications of computer-aided engineering systems to the design, analysis, and optimization of mechanical engineering components and systems. Concurrent registration: MAE 195. (Spring)
- 197 **Robotic Systems Design and Applications** (3) Staff
Modeling and analysis of robot designs. Kinematics, statics, and dynamics of linkages. Design and selection of mechanical structures, actuators, transmissions, and sensors. Design of robotic control systems. Relevant computer hardware and software. Industrial applications and limitations of robot systems. Lab experiments. Same as ECE 192. Prerequisite: MAE 182. (Spring)
- 198 **Research** (1 to 3) Staff
Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)
- 199 **Student Design Project** (1 to 3) Staff
Special student projects involving extensive design of various mechanical engineering systems. Examples include the solar car, mini-Baja, or other design competitions that typically are national in scope. May be taken for graduate credit by graduate students. (As arranged)

MEDIA AND PUBLIC AFFAIRS

Professors C.H. Sterling, J.B. Manheim (*Director*), J.L. Folkerts, C. Stern, S.V. Roberts
Associate Professors J.E. Thiel, J.E. Steele, S.L. Livingston, L.S. Harvey, A.L. May III,
L. Willnat

Assistant Professors S. Keller, P.C. O'Brien, P.F. Phalen, D. Liban, S. Aday, K.A. Gross
Adjunct Assistant Professor M.M. Travis

Professorial Lecturer L.B. Laurent

Associate Professorial Lecturers J.A. Echave, L.C. Francis, M.C. McAllister, A. Crowe

Through the Columbian College of Arts and Sciences, the School of Media and Public Affairs offers programs of study leading to the Bachelor of Arts in the fields of journalism, political communication, and electronic media. Entering freshmen may be admitted to degree programs within the School of Media and Public Affairs through a competitive application process. This process is specified in application materials distributed by the Office of Admissions.

In addition, a limited number of students will be admitted through a competitive application process that begins after the student is accepted to the University. Students are encouraged to apply during the first semester of their sophomore year; applications are not accepted from students with more than 75 credit hours. Minimum requirements for admission include the completion of prerequisites with specified grades for each program and a minimum GPA of 3.0. Achievement of the minimum GPA does not guarantee admission. Once admitted to the University, students desiring to enter SMPA face a highly selective process. Contact directors of the programs for specific information and applications; program application requirements vary and in some cases include achieving specific

grades in certain courses and completion of an essay. Programs are listed below with their course offerings.

All students, both those admitted directly into SMPA and those applying after acceptance to GW, must achieve specified grades in some courses. Check with the program director for particular grade requirements and course sequencing.

All students enrolled in majors offered by the School of Media and Public Affairs must take SMPA 50, 51 and 199.

Five-Year Bachelor of Arts in an SMPA major and Master of Arts in the field of political management—Through Columbian College of Arts and Sciences, the School of Media and Public Affairs and the Graduate School of Political Management offer a joint five-year B.A./M.A. program in media and political management. Students who successfully complete the program receive a B.A. in one of the three majors offered by SMPA and an M.A. in the field of political management. SMPA students applying for the joint degree program must do so during the second semester of their junior year. Applicants must take the Graduate Record Examination during the junior year at a time that will allow scores to be considered as a part of the application, and scores must meet requirements of Columbian College of Arts and Sciences. Undergraduates who are interested in this program should speak with their SMPA program director at the earliest possible date.

Students in the five-year program must meet all of the requirements of their respective SMPA majors. All course choices within the major should be in consultation with an advisor. During their senior year students choose two courses from PMgt 201, 206, 207, 260. For students accepted into the program, the Graduate School of Political Management reduces the 400-hour internship requirement, consistent with the time requirements of full-time graduate study. During the undergraduate phase of the program, students are encouraged to take full advantage of internship opportunities for which they can earn credit.

SCHOOL OF MEDIA AND PUBLIC AFFAIRS

- 50 Introduction to Media and Public Affairs (3)** Folkerts, Harvey, Keller, Livingston, Phalen, Steele
The historical and philosophical origins of contemporary communication, both as a significant aspect of public and private life and as a field of inquiry; the principal approaches to studying communication and the role of communication in the contemporary era.
- 51 Research Methods (3)** May, Manheim, Willnat
Processes of inquiry within mediated communication. Students are introduced to concepts of framing research questions, conducting literature reviews, developing a research design, and interpreting results of cultural and social science research within a societal framework. Prerequisite: Stat 53. Laboratory fee, \$50.
- 125 Forensics Practice (Debate) (1)** Keller
Participation in intercollegiate debate activities as a member of the GW varsity, junior varsity, or novice debate teams. In-depth research on the national intercollegiate debate resolution, practice rounds, and travel to debate tournaments. May be repeated for credit.
- 150 International Communication (3)** Willnat
Major international news-gathering and broadcasting organizations, international communications policy forums, organizations and treaties, spectrum allocation criteria, communications technology, and trade in communication.
- 190 Selected Topics (3)** Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 199 Senior Seminar (3)** Manheim, Sterling, Folkerts, Livingston, Harvey, Phalen, May, Steele
Capstone course limited to SMPA program majors. Selected reading and discussion with possible fieldwork. Students should consult program director regarding additional restrictions on enrollment.

JOURNALISM

Bachelor of Arts with a major in journalism—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.

2. Prerequisite courses—Jour 100, 111; SMPA 50. A grade of *B* or better in Jour 111 is required to remain in good standing in the program or to apply to the program.

3. Required courses in SMPA: SMPA 51 and 199.

4. Required courses in the major: 24 hours of 100-level courses, including Jour 112 and 150; 6 hours chosen from Jour 120, 121, 122, 123, 124; 3 hours chosen from Jour 130, 131, 132, 134, 135; 3 hours chosen from Jour 123, 124, 140, 141, 142, 147, or EMda 75, 140; 3 hours chosen from Jour 152, 153, or PCm 128; 3 hours chosen from any journalism course.

5. Required courses in related areas: Engl 51–52 or 71–72; 6 hours chosen from PSc 1, 2, 3, or Hist 71–72; plus an area of specialization consisting of a minor in another field or 18 hours of courses representing a cohesive area of study and approved by the advisor. If the second option is chosen, at least 12 hours must be at the 100 level. Minors or specializations must be in programs outside SMPA.

Minor in journalism—21 credit hours of journalism courses, including Jour 100, 111; 6 hours chosen from Jour 120, 121, 122, 123, 124, 130, 131, 132, 134, 135; 3 hours from Jour 140, 141, 142, 147, or EMda 75, 140; and 3 hours from Jour 150, 152, 153, or PCm 128.

Special Honors—Students with a 3.5 GPA in all courses completed at GW and in all courses required for the major may apply for special honors in journalism. A student intending to apply must consult with the journalism program director at the start of the senior year. Application must be made by the mid-point of the graduation semester (October 15 or March 15) and must include a letter of application and a portfolio of published or broadcast work. The work will be evaluated by the journalism faculty on the basis of professional standards as outlined by the program director.

100 Journalism: Theory and Practice (3) Aday, Steele

An overview of journalism in the United States. Introduces students to organizations and institutions of the American news media, outlines basic history and social context of American journalism, examines how news is constructed, and explores intellectual underpinnings of the occupational ideals and professional practices that guide journalism today.

111 Reporting and Writing the News (3) Crowe, Matzke

Fundamentals of news reporting and writing, with emphasis on the print media. News judgment, information gathering skills, and facility in crafting news and feature stories. Regular in-class and outside reporting and writing exercises to learn journalistic style. Directly admitted freshmen are eligible; all other freshmen need departmental permission to enroll. Laboratory fee, \$100.

112 Advanced Reporting (3) May

Reporting, writing, and computer skills for covering beats and developing in-depth news stories. Techniques in researching, observing, and interviewing to frame stories of public interest will be learned through outside and in-class reporting and writing assignments. Laboratory fee, \$100. Prerequisite: Jour 111. Restricted to journalism majors or permission of instructor required.

120 Editorial and Persuasive Writing (3) Keller

Techniques of editorial and column writing; editorial page and public affairs programming; function of commentary in a free press. Prerequisite: Jour 111.

121 Feature Writing (3) Roberts

Development and writing of a wide range of feature articles, including interviews, profiles, op-ed columns, and personal memoirs. Emphasis on weekly writing assignments and practical experience, including marketing work to publications. Prerequisite: Jour 111.

122 Broadcast News Reporting (3) Stern

Preparation of radio and television scripts based on actual news events. Using workshop techniques, scripts are evaluated for content, structure and use of words, pictures and sound. Extensive use of network news reports. Prerequisite: Jour 111.

123 Computer-Assisted Reporting (3) Staff

Retrieving information from online sources and government databases, with emphasis on the ethical use and evaluation of data. Use of computer databases to analyze records and produce reliable and valid data for investigative news stories. Laboratory fee, \$100. Prerequisite: Jour 111.

124 News Online (3) Staff

The examination and practice of journalism on the Internet with an emphasis on news writing and presentation, including web page design. Students are exposed to news standards, approaches to online writing, ethics, and issues of

access on the web and introduced to production techniques. Prerequisite: Jour 111.

- 130 Business and Technology Reporting (3)** Staff
Development of reporting and writing techniques in covering the world of money and work. The course explores how the media relate economic changes to the general public, and develops journalistic practices through exercises in writing and analyzing trends in broad range of topics, including business, banking, labor, and international trade. Prerequisite: Jour 111.
- 131 Science/Medical Reporting (3)** Staff
Translating the worlds of science and medicine for a mass audience. Using in-class exercises and outside assignments, students will acquire reporting and writing skills needed to understand and present complex topics to readers and viewers. Prerequisite: Jour 111. (Even years)
- 132 Campaign Reporting (3)** May
Developing news gathering and writing skills needed for the coverage of political campaigns. Using in-class exercises and outside assignments, students will acquire reporting and writing proficiency needed to illuminate how campaigns work and how politics affects the lives of citizens. Same as PCm 132. Prerequisite: Jour 111.
- 134 Washington Reporting (3)** May
Examination of reporting and writing techniques employed in news coverage of the national government, with an emphasis on serving a regional readership or audience. Using Washington as a laboratory, students focus on contemporary issues and news makers in the legislative and executive branches of government. Prerequisite: Jour 111.
- 135 Critical Writing and Reviewing (3)** Laurent
Reviewing and commenting on the arts and entertainment for the mass media. Prerequisite: Jour 111.
- 140 Photojournalism (3)** Echave
Elements of effective news and feature photos, including study and evaluation of slides taken by students. Picture selection, cropping, captions. Student costs include film and developing.
- 141 Newspaper Editing and Design (3)** McAllister
Emphasis on newspaper design, editing, and layout. Selecting and editing stories; writing headlines and photo captions; selecting, sizing, and cropping photos and other graphic materials; laying out pages. Ethics of editing.
- 142 Magazine Editing and Design (3)** Staff
Setting editorial goals; planning content and production to meet them. Editing copy; working with art directors. Layout, typography, and design for magazines, house organs, and similar publications for associations, institutions, and industry.
- 147 Television Workshop (3)** Staff
Same as EMda 147.
- 150 Media Law (3)** Stern
Freedom of the press, censorship, legislative controls, copyright, laws of libel and privacy, and business laws relating to the news business, privilege, and fair comment.
- 152 U.S. Journalism History (3)** Folkerts
History of American journalism, starting with the colonial period; political, social and economic developments. Media relations with government; the evolving concept of journalistic rights and responsibilities.
- 153 Covering Court Decisions (3)** Stern
Primer for journalists on how the courts and the Constitution work. Emphasis on reading and reporting U.S. Supreme Court rulings and understanding legal principles.
- 190 Selected Topics (3)** Staff
Topic and fee, if charged, announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 196 Independent Study (1 to 6)** May
The student pursues a program of directed reading, research, and writing under the direction of a faculty advisor. Limited to seniors. Permission of the program director required.

197 Internship (1 to 3)

May

Students spend at least 5 hours per week per credit during the semester in an approved news organization performing work under the general direction of the journalism program director. Grades are assigned on a Pass/No Pass basis only. Restricted to juniors and seniors majoring or minoring in journalism. Permission of the program director required. May be repeated for up to 6 credits.

ELECTRONIC MEDIA

Bachelor of Arts with a major in electronic media—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses: SMPA 50; EMda 75.
3. Required courses in SMPA: SMPA 51 and 199.
4. Required courses in the major: EMda 100, 141, 144, 145, and 18 additional hours of 100-level courses in electronic media (excluding EMda 197), as approved by the major advisor; 9 of these hours must be in the 180–89 sequence.
5. Required courses in related areas: 15 credit hours of 100-level courses in one other department, program, or field of study, as approved by the major advisor.

Minor in electronic media—EMda 75 or 140 (taken first); and 15 additional credit hours, including EMda 100, one course in the 170–79 sequence, one course in the 180–89 sequence, and two additional electronic media courses numbered above 100.

Note: For EMda 75, 140, 142, 144, 145, and 146, attendance on the first meeting day of the class is required because equipment and scheduling instruction is provided that will not be repeated.

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| 75 Sight and Sound (3) | Thiel |
| Development of a critical awareness of aural and visual communication through an introduction to the aesthetics, techniques, and organization of the creative process in electronic media. Lecture (2½ hours), laboratory (2 hours). Prerequisite: permission of instructor for nonmajors. Laboratory fee, \$65. (Fall and spring) | |
| 100 American Electronic Media (3) | Harvey, Phalen, O'Brien, and Staff |
| Study of the origins, structure, and nature of American broadcasting and related media. (Fall and Spring) | |
| 129 Television and Politics (3) | Staff |
| Same as PCm/PSc 129. | |
| 140 Production for Non-Majors (3) | Staff |
| Basic concepts of radio and television as communication media; emphasis on design and production techniques, with applications in political communication. Laboratory fee, \$75. (Fall and spring) | |
| 141 Scriptwriting (3) | Harvey, Thiel, O'Brien |
| Study and practice of the forms, techniques, and types of writing for radio, television, and film. Prerequisite: Engl 11; EMda 75 for EMda majors; permission of instructor for non-majors. | |
| 142 Radio and Television Performance (3) | Thiel |
| Introduction to the basic theories and techniques required for effective, non-dramatic media performance (i.e., announcing, moderating, newscasting, etc.). Laboratory fee, \$100. | |
| 144 Sound Design (3) | Liban, O'Brien |
| Introduction to basic concepts of traditional audio and sound design as a creative communication medium; emphasis on design and technique for a variety of formats, including field production and nonlinear editing. Lecture (2 hours), laboratory (2 hours). Prerequisite: EMda 75. Laboratory fee, \$100. (Fall and spring) | |
| 145 Image Design (3) | O'Brien, Liban |
| Introduction to basic concepts of video as a creative communication medium; design and technique, planning, and directing in a studio context. Lecture (1½ hours), laboratory (3½ hours). Prerequisite: EMda 144. Laboratory fee, \$100. (Fall and spring) | |
| 146 Television Directing (6) | Thiel |
| Advanced study and practice of television directing techniques. Students are expected to demonstrate skill in working with studio and field equipment and | |

- in developing television programs from original concepts to final production. Lecture (3 hours), laboratory (4 hours). Prerequisite: EMda 145 and permission of instructor. Laboratory fee, \$100.
- 147 **Television Workshop (3)** Liban
Hands-on workshop designed to give simulated TV industry experience. Students work together to produce and direct a newsmagazine program. May be repeated once for credit. Prerequisite: Jour 111 (for journalism majors), EMda 145 (for electronic media majors). Laboratory fee, \$100. Same as Jour 147.
- 171 **Language of Cinema (3)** Travis
Introduction to cinema as language through analysis of the components of film structure—camera, editing, sound, movement, music, dialogue, and mise-en-scène. Laboratory fee, \$75.
- 173 **History of Cinema (3)** Travis
An examination of the history, structure, and theory of motion pictures in America and abroad. Same as AH 173. Laboratory fee, \$75. (Fall)
- 174 **Special Studies in Film (3)** Travis
In-depth study of specific film topics. Prerequisite: EMda 173. Laboratory fee, \$75. (Spring)
- 175 **The Political Image (3)** Travis
An analysis of the techniques of propaganda and rhetoric used in film and television to visualize political ideology. Laboratory fee, \$75. (Spring, even years)
- 176 **Film as Fact and Fiction (3)** Travis
A comparison of structural differences between documentary and fiction film in order to study how each presents different versions of reality. Laboratory fee, \$75. (Spring, odd years)
- 180 **Electronic Media Policy (3)** Sterling
Legal, technical, political, economic, and social aspects of radio, television, and cable and related delivery systems. Structure and operation of the FCC and other agencies, plus the role of Congress and the courts. Spectrum allocation, behavioral regulation, the trend to deregulate political influence, and current policy issues. Prerequisite: EMda 100.
- 181 **Media Management (3)** O'Brien
Decision making, strategic planning, and daily operations of radio, television, and cable; programming and sales strategies, promotion, and impact of ratings and research. Prerequisite: EMda 100.
- 182 **Innovation in Electronic Media (3)** Harvey
Examination of current and likely future trends in electronic media, with emphasis on radio, television, and cable, including developments in technology, programming, and public policy and their cultural implications. Prerequisite: EMda 100.
- 183 **Development of American Electronic Media (3)** Sterling
The development of radio, television, cable, and newer media services: changing technologies; national and local industry structures and economics; program trends; audience research and impact; regulatory developments. Prerequisite: EMda 100.
- 185 **Comparative Communication Systems (3)** Willnat
In-depth study of the developmental, regulatory, political, economic, and cultural dimensions of selected foreign communication systems. Prerequisite: EMda 100.
- 186 **Commercialization of Broadcasting (3)** O'Brien
The commercialization of broadcasting and the social and cultural impact of the medium. Examination of the widely held belief that American culture has been shaped largely by the products and services, as marketed through broadcast outlets, that Americans consume. Prerequisite: EMda 100.
- 187 **Cultural Theory of Mass Media (3)** Harvey
The various ways in which cultural meaning becomes embedded in objects of the imagination, particularly as they manifest in the U.S. mass media. Prerequisite: EMda 100.
- 188 **Effects of Electronic Media (3)** Phalen and Staff
Concepts of the impact of broadcasting and related media on audiences; social science research findings and methods, including persuasion, formation of opinion, media and personal interaction, the depiction of violence, audience

characteristics and media use patterns, and development of related theories and models of mass communication. Prerequisite: EMda 100.

- 190 **Selected Topics in Electronic Media** (3) Staff
Topic and fee announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 196 **Independent Study** (1 to 3) Staff
Independent research and special projects. Before students are permitted to register, they must submit a written proposal of the plan of study and obtain approval of the faculty member who will be directing the study and of the program director.
- 197 **Internship** (1 to 3) Liban
Open to juniors and seniors in electronic media. Students spend at least 16 hours a week in an approved media position with a local nonprofit, corporate, or commercial organization. Seminar meetings, reports, and career-oriented projects. Admission requires an application and approval of the program director. Grades are Pass/No Pass only. May be repeated once for credit.

POLITICAL COMMUNICATION

Bachelor of Arts with a major in political communication—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses: SMPA 50; PSc 2 and either PSc 1 or 3; Psyc 1; Stat 53.
3. Required courses in SMPA: SMPA 51 and 199.
4. Required courses in the major: PCm 100; Psyc 156; Jour 111; and 18 hours of 100-level courses in political communication. PCm 100 should be taken in the second semester of the sophomore year; a grade of C or better is required. The 18 hours of 100-level courses in political communication may include EMda 140 and SMPA 150. With permission of the program director, seniors with a grade-point average of 3.0 or better may apply one course in the Graduate School of Political Management toward this requirement.
5. Required courses in related areas: 6 additional credit hours of 100-level political science courses, and 6 additional credit hours of 100-level courses from any other program in the School of Media and Public Affairs.

Special Honors—Students with a grade-point average of 3.5 or better in all course work completed at George Washington University and in all courses required for the major may declare for Special Honors at the beginning of the senior year. Students declaring for Special Honors take PCm 196 in the first semester of the senior year and SMPA 199 in the second semester. To achieve Special Honors, the student must maintain the stated GPA requirements and present a successful oral defense of a research paper prepared for the Senior Seminar before a committee that includes the Senior Seminar instructor and two other faculty members nominated by the student and approved by the program director.

- 100 **Introduction to Political Communication** (3) Manheim, Livingston, Willnat, Gross
Basic concepts and theories of political communication; development of a framework for analyzing political communication; applications in the United States, other countries, and the international system. Open only to political communication majors. Prerequisite: SMPA 50.
- 128 **Media, Politics, and Government** (3) Roberts
Exploration of the role played by communication, principally through the mass media, in the conduct of government and the making of public policy. Same as PSc 128.
- 129 **Television and Politics** (3)
Same as PSc/EMda 129.
- 132 **Campaign Reporting** (3) Staff
Same as Jour 132.
- 140 **Media and Foreign Policy** (3) Livingston
Emerging role of news media in international affairs and diplomacy, particularly as it relates to U.S. foreign policy. Globalization of the news media, advances in instantaneous communications technologies, consequences for international diplomacy.

- 150 Principles of Public Relations (3)** Staff
Principles, problems, ethics, and law of public relations for government, private concerns, educational and other public institutions.
- 152 Public Affairs and Government Information (3)** Staff
Aspects of information and public affairs functions of government agencies at all levels. Role of the information specialist. Writing and editing for government publications.
- 155 Strategic Political Communication (3)** Manheim
Origins of strategic approaches to political communication; techniques. Use of strategic communication by individuals, groups, organizations, and governments in both domestic politics and policymaking and in the international system. Prerequisite: PCm 100 or permission of the instructor.
- 157 Political Campaign Communication (3)** Francis
Communication aspects of political campaigns for candidates and ballot issues. Examination of techniques and channels of communication, role of communication in campaign strategy, ethics and implications of campaign decision making.
- 158 Political Campaign Advertising (3)** Keller
Introduction to the theory and practice of campaign advertising. Emphasis on televised political campaign spots, but a range of campaign advertising mediums are included: radio, direct mail, and the Internet.
- 170 Political Debate (3)** Keller
Theory and practice of political debate. The campaign context, candidate strategies, debate issues, and debates and voter behavior. Participation in classroom debates.
- 171 Political Oratory and Speech Writing (3)** Keller
Theory and practice of public speaking in the context of mediated political communication. Students analyze, write, and give speeches.
- 190 Selected Topics (3)** Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 196 Independent Study (1 to 6)** Livingston
The student pursues a program of directed reading or original research under the direction of a faculty advisor. Limited to seniors pursuing Special Honors in political communication. Before registering, the student must obtain approval of a written plan of study by the faculty member who will direct the study and by the program director.
- 197 Field Experience (3)** Livingston
Open to juniors and seniors majoring in political communication. Students spend at least 16 hours a week during the semester in an approved agency or office performing practical work in the subject under the general guidance of a faculty advisor. Grades are assigned on a Pass/No Pass basis only. May be repeated for credit once.

MIDDLE EASTERN STUDIES

Program Committee: D. Khoury (*Director*), M. Bernstein, N. Brown, D. Dassa Kaye, S. Montasser, Y. Moses, B. Reich

The Elliott School of International Affairs offers a multidisciplinary program leading to a Bachelor of Arts with a major in the field of Middle Eastern Studies.

Bachelor of Arts with a major in Middle Eastern studies—The following requirements must be fulfilled:

1. The general curriculum requirements stated under the Elliott School of International Affairs, including Hmn 8 as the foundation course.

2. Required courses for the major—(a) 6 credit hours selected from Hist 107, 108, 114, 115, 158, 193, 194; (b) 6 hours selected from PSc 176, 177, 178, 179; (c) 6 hours selected from Rel 9, 107, 112, 115, 161, 163, 164, 165; (d) 3 hours selected from Econ 136, 151, 181–82; (e) 3 hours selected from Arab 103, 104; Clas 81, 82, 100, 101, 102; and Hebr 104, 120–21; 6 additional hours of course work related to the Middle East from any department, to be selected in consultation with the program director.

3. Completion of third-year-level language study in Arabic (Arab 10) or Hebrew (Hebr 106).

Special Honors—In addition to the general requirements stated under University Regulations, a candidate for Special Honors in Middle Eastern studies must have attained a 3.4 grade-point average overall and complete either an Elliott School or Honors senior seminar, or an Honors senior thesis or a major independent study research project approved by the program director. Students must apply for honors candidacy prior to the beginning of the senior year.

Students should consult the program guidelines available from the Elliott School for courses pertinent to Middle Eastern studies. Courses in addition to those listed may be substituted with permission of the program director. Students should consult the program director concerning certain Special Topics or Selected Topics courses that may also be part of this program.

MUSIC

Professor R.J. Guenther (Chair)

Associate Professors L. Youens, K. Ahlquist

Assistant Professors B. Fritz, M.W. Mehaffey, D. Boyce

Adjunct Associate Professors M. Garst (Piano and Harpsichord), M. Peris (Piano), R. Baker (Voice), R. Parnas (Violin and Viola), M. Sislen (Guitar), C.J. Pickar, L. Barnett (Cello)

Adjunct Assistant Professors J.E. White (Voice), J. Albertson (Guitar), F.B. Conlon (Piano), J.D. Levy (Jazz Improvisation), T. Konstantinov (Piano), R. Birch (Trumpet)

Adjunct Instructors M. Findley (Violin), E. Guenther (Pipe Organ), L. Lipnick (Bassoon), B.R. Seidman (Harp), S. Wellman (Voice), R. White (Oboe), P. Edgar (Percussion), S.M. Fearing (French Horn), D. Marsh (Electric Bass), M. Von Villas (Opera), J.C. Connell (Percussion), J. Krash (Piano), L. Hertel (Flute), E. Waters (Guitar), L. Gilliam (Recorder), R. Loza (Percussion), P. Fraize (Jazz Performance/Saxophone), R. Couto (Trumpet), B. Dahlman (Piano), D. Alston (Orchestra), S. Brown (Piano), A. Reiff (Voice), S. Stang-McCusker (Flute), R. Anstine Smith (Harp), L. Ferguson (Clarinet), N. Snider (Cello), A. Mikolajewski (Accompanist), M. Scarlett (Voice)

Assistant Professorial Lecturer S. Hilmy (Electronic Studio)

Bachelor of Arts with a major in music—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Mus 1, 2, 5–6, 9–10; 8 hours of applied music courses in the student's principal performance area.
3. The language option listed under the General Curriculum Requirements of Columbian College.
4. Required courses in the major—Mus 101–2, 103–4, 139; 4 hours of music ensemble courses; 4 additional hours either in applied music or music ensemble courses. The departmental requirement for proficiency in piano must be satisfied by the end of the semester preceding graduation. All majors are expected to attend and perform regularly in student recitals.

Bachelor of Music—Admission to the Bachelor of Music degree program with a major in performance requires demonstration by audition of special advanced pre-admission training and aptitude. In addition to the general requirements stated under Columbian College of Arts and Sciences, the 129-credit-hour program requires music courses as follows: Mus 5–6, 9–10, 101–2, 103–4, 131, 139, 151, 173; one 100-level elective each in music theory/composition and history/literature; 6 hours of ensemble courses; 20 hours of applied music in the major instrument or voice, including at least 12 hours in 100-level courses; 6 hours of additional courses in performance; and 14 hours of electives. The departmental requirement of proficiency in piano must be satisfied by the semester preceding graduation. Students in this program are required to pursue the language option listed under the General Curriculum Requirements of Columbian College. A half-recital is required during the junior year, and a full public recital is required during the senior year. All majors are expected to attend and perform regularly in student recitals.

Special Honors in Music—To receive Special Honors in music, a student must meet the requirements stated under University Regulations and maintain a 3.5 grade-point average in music courses and at least a 3.0 average overall. The student must apply by the end of the junior year and complete an approved independent project under faculty supervision. Projects involving performance may replace up to 4 credits of applied music in the student's principal performance medium.

Minor in music—21 credit hours of music courses, consisting of Mus 1, 2 or 9, 5, 101–2 or 103–4, 6 hours of applied music study, and 2 hours of music electives. Level 1 piano proficiency is required; students with sufficient piano proficiency, as determined by an examination, may elect another applied music area for concentration. Recital attendance and public performance are required.

Minor in jazz studies—21 credit hours of music courses, consisting of Mus 1, 2, 8, 9–10, 70, 161; 4 hours of jazz performance techniques (Mus 59–60 or 159–60); and 2 hours of ensemble participation (Mus 52 or 55). Students must satisfy the requirement of Level 1 jazz piano proficiency. Mus 1 and 2 are prerequisite to declaration of the jazz studies minor. Recital attendance and public performance are required.

Departmental Prerequisite: Mus 1 and 2 are prerequisite to all other courses required of music majors with the exception of applied music and ensemble courses. A student must demonstrate Level 1 proficiency in piano and must achieve a grade of C or better in Mus 1 and 2 to be allowed to declare the music major in the B.A. curriculum. All students with a declared major in music are required to emphasize performance study in one instrument or voice and to appear for performance final examinations at the end of each semester of study in that area; a minimum of three consecutive examinations is required. A placement audition to determine the initial level of study is administered at the time the major is declared. Satisfactory progress in the principal performance area, as determined by the department's repertoire and study-level guidelines and performance final examinations, is required for continuance in the major. Continuous registration in piano is required of all declared music majors and minors until the relevant piano proficiency requirements have been met. Regular attendance at public concerts and recitals is required of all music majors and minors as a part of their applied music study.

MUSIC THEORY, HISTORY, AND LITERATURE

- 1 **Elements of Music Theory** (3) Boyce
Theoretical and written coverage of notation, scales, keys, intervals, terms, rhythms, and chord structure and progression. Introduction to music literature, with emphasis on rudimentary aural analysis. Concurrent registration in Mus 2 is required for music majors. (Fall and spring)
- 2 **Ear Training I** (1) Staff
Aural skills development through melodic, harmonic, and rhythmic dictation and sight singing. Content is coordinated with Mus 1. Two 50-minute sessions per week. Prerequisite or concurrent registration: Mus 1. (Fall and spring)
- 3 **Music in the Western World** (3) Staff
Introductory history of musical styles, related to listening; study of music materials and media. Not open to music majors. (Spring)
- 4 **Topics in Music for Non-Majors** (3) Staff
A rotating set of classes on American music topics, a composer, the opera, and musical life in Washington, D.C. Not open to music majors. (Spring)
- 5–6 **Harmony** (3–3) Boyce
Triads, inversions; chord analysis, construction, and progression; figured-bass realization, part writing, modulation, altered chords. Concurrent registration in the appropriate section of Mus 9–10 and in the weekly keyboard lab is required for music majors. Prerequisite: Mus 1; Mus 5 is prerequisite to Mus 6. (Academic year)
- 7 **Music of the World** (3) Ahlquist
Study of music from selected cultures around the world. (Spring)
- 8 **History of Jazz** (3) Lornell
Introduction to the styles, composers, and performers of jazz music from its origins to the present. (Spring)
- 9 **Ear Training II** (1) Staff
Content is coordinated with Mus 5. Two 50-minute sessions per week. Prerequisite: Mus 2. (Fall)
- 10 **Ear Training III** (1) Staff
Content is coordinated with Mus 6. Two 50-minute sessions per week. Prerequisite: Mus 9. (Spring)
- 70 **Introduction to Jazz Harmony** (3) Levy
This course develops the ability to analyze and write tunes in jazz/pop styles. Study of rhythmic characteristics, voice-leading, and chord/scale relationships within a jazz context. Prerequisite: Mus 1. (Spring)

- 101-2 History of Music I (3-3)** Youens
Development of music in the Western world from the early Christian era through the Baroque. Prerequisite: Mus 1; Mus 101 is prerequisite to Mus 102. (Academic year)
- 103-4 History of Music II (3-3)** Ahlquist
Development of Western music from the Classical period to the present. Prerequisite: Mus 5 or permission of instructor; Mus 103 is prerequisite to Mus 104. (Academic year)
- 109 Orchestra Literature (3)** Guenther
Survey of the history and styles of orchestra literature, analysis of representative works. Prerequisite: Mus 5 or permission of instructor.
- 110 Chamber Music Literature (3)** Youens
Survey of the history and styles of chamber music literature, analysis of representative works. Prerequisite: Mus 5 or permission of instructor.
- 121 The Opera (3)** Youens
Survey of the history and styles of opera, analysis of representative works. Prerequisite: Mus 5 or equivalent.
- 122 Music in the United States (3)** Ahlquist
History of music and musical life in the United States, emphasizing relationships among traditions of diverse origin. Prerequisite: Mus 1. (Spring, alternate years)
- 125 Keyboard Music Literature (3)** Staff
Survey of the history, style, and major content of the keyboard literature from the 16th century to the present. Prerequisite: Mus 5 or equivalent.
- 131-32 Advanced Theory (3-3)** Staff
Practice in 18th-century contrapuntal writing and analysis, chorale preludes, inventions, and fugues. Prerequisite: Mus 5-6 or equivalent; Mus 131 is prerequisite to Mus 132. (Alternate academic years)
- 133-34 Composition (3-3)** Boyce
May be repeated for credit. Prerequisite: Mus 6. (Academic year)
- 135 Counterpoint (3)** Staff
Study and practice of 16th-century contrapuntal techniques. Prerequisite: Mus 131.
- 137 Orchestration (3)** Staff
Instrumental scoring. Prerequisite: Mus 6.
- 139 Form and Analysis (3)** Guenther
Analysis of musical forms in representative musical literature. Prerequisite: Mus 5-6 or equivalent.
- 151 Conducting (3)** Fritz
Technique of conducting, score reading, rehearsal procedures, analysis, and interpretation of selected musical literature; practice in conducting. Prerequisite: Mus 5. (Fall, even years)
- 161-62 Electronic and Computer Music (3-3)** Hilmy
Fundamental electronic and computer music concepts. Analog and digital sound synthesis techniques and theory, MIDI, studio recording techniques, signal processing, properties of sound, acoustics and psycho-acoustics, history and aesthetics. Laboratory fee: \$50 per semester. (Academic year)
- 173 Pedagogy (3)** Staff
Principles, materials, and methods of teaching in selected areas. Prerequisite: admission to 100-level performance study.
- 199 Independent Research (3)** Staff
Under the guidance of an assigned instructor. Open only to qualified music majors. May be repeated for credit. (Fall and spring)

APPLIED MUSIC

Applied music courses are offered both fall and spring, and may be repeated for credit. For courses numbered 11 through 50 and 57 through 60, students may not register in the same semester for both the 1- and 2-credit course in the same instrument or in voice. Mus 51, 52, 53, 55, 56, and 153 do not include individual lessons and do not require a supplementary fee. Mus 61-62 and 63, involving group study of beginning piano and voice, likewise do not require a supplementary fee. All other applied music courses include individual lessons and require a supplementary fee, as follows:

1. One-credit-hour courses: individual lessons of one-half hour a week, supplementary fee, \$75.

2. Two- or three-credit-hour courses: individual lessons of one hour a week, supplementary fee, \$150.

Supplementary fees for applied music courses are nonrefundable after the first two weeks of the fall and spring semesters. Consult the Music Department for details.

The supplementary fee is waived during the fall and spring semesters for full-time music majors and minors and for Presidential Arts Scholars in Music.

Departmental prerequisite: For Mus 11-12, Mus 61 or demonstration of adequate preparation. For Mus 15-16, level 2 piano proficiency or permission of instructor.

Required practice: a minimum of three hours a week for 1-credit courses and six hours a week for 2-credit courses.

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|---|---------------------------|
| 11-12 Piano (1-2) | Staff |
| 13-14 Voice (1-2) | Staff |
| 15-16 Pipe Organ (1-2) | E. Guenther |
| 17-18 Violin (1-2) | Parnas, Findley, Steiner |
| 19-20 Classical Guitar (1-2) | Waters, Albertson, Sislen |
| 21-22 Viola (1-2) | Parnas |
| 23-24 Cello (1-2) | Barnet, Snider |
| 25-26 Bass (1-2) | Marsh |
| 27-28 Flute (1-2) | Hertel, Stang-McCusker |
| 29-30 Recorder (1-2) | Gilliam |
| 31-32 Oboe (1-2) | R. White |
| 33-34 Clarinet (1-2) | Ferguson |
| 35-36 Saxophone (1-2) | Fraize |
| 37-38 Bassoon (1-2) | Lipnick |
| 39-40 French Horn (1-2) | Fearing |
| 41-42 Trumpet (1-2) | Birch |
| 43-44 Trombone (1-2) | Staff |
| 45-46 Percussion (1-2) | Edgar, Connell |
| 47-48 Harp (1-2) | Seidman, Smith |
| 49-50 Tuba (1-2) | Staff |
| 51 University Symphony Orchestra (1) | Alston |
| Preparation and performance of orchestral literature. Prerequisite: audition before director. | |
| 52 Instrumental Ensemble (1) | Staff |
| Chamber ensemble groups approved by audition. See the <i>Schedule of Classes</i> for complete listing; Section numbers are .10 flute choir, .11 guitar ensemble, .12 percussion ensemble, .13 jazz combo, .14 keyboard ensemble, .15 string ensemble, .16 woodwind ensemble, .17 brass ensemble, .18 Baroque ensemble, .19 Latin band, .20 blues revue. | |
| 53 University Singers (1) | Mehaffey |
| Preparation and performance of choral literature. Prerequisite: audition before director. | |
| 55 Jazz Band (1) | Levy |
| Preparation and performance of classic and contemporary "big band" literature. Prerequisite: audition before director. | |
| 56 University Band (1) | Fritz, Birch |
| Section .10 is University Symphonic Band; Section .11 is University Wind Ensemble. | |
| 57-58 Harpsichord (1-2) | Garst |
| 59-60 Jazz Performance Techniques (1-2) | Staff |
| See the <i>Schedule of Classes</i> for complete listing; Section numbers are .10 piano, .11 bass, .12 percussion, .13 guitar, .14 brass, .15 woodwind. | |
| 61-62 Class Piano for Beginners (1-1) | Staff |
| Mus 61: Study of the rudiments of musical notation and piano playing in a small classroom setting; designed to take students who do not read music to a beginner's level of proficiency. Mus 62: Applied piano study in a small classroom setting; designed to prepare music majors and minors to attain Level 1 of the departmental piano proficiency requirement. Prerequisite: Mus 61 or permission of the instructor. Open to all undergraduates. | |

63 Class Voice for Beginners (1)

Staff

Study of the rudiments of musical notation and basic vocal technique in a small classroom setting. Open to all undergraduates.

81-82 Lute (1-2)

Albertson

Departmental prerequisite: For 100-level applied music courses, an audition before an appropriate faculty committee.

Required practice: a minimum of six hours a week for 1-credit courses and 12 hours a week for 3-credit courses. In addition, 3-credit courses include master performance classes and require performance in student recitals and appearance for a performance final examination.

111-12 Piano (1-3)

Staff

113-14 Voice (1-3)

Staff

115-16 Pipe Organ (1-3)

E. Guenther

117-18 Orchestral Instrument (1-3)

Staff

119-20 Classical Guitar (1-3)

Albertson, Sislen, Waters

153 Vocal Theater Workshop (1)

Von Villas, Conlon

A performance-oriented program. In the fall semester the stress is on development of body awareness for the stage, acting improvisations, and character development. Scenes chosen from the opera, operetta, and musical theater repertoire. In the spring semester, musical coaching, use of makeup, and audition preparation is included.

155-156 Voice Study for the Theatre (1-3)

Staff

157-158 Harpsichord (1-3)

Garst

159-60 Jazz Performance Techniques (1-3)

Staff

NAVAL SCIENCE

Professor R.L. Williams (Chair)

Associate Professor J.P. Anderson

Assistant Professors P.M. Hannigan, M.L. Weeldreyer, D.A. Pulczinski, D.R. Brakob, J.D. Calvert

Naval Reserve Officers Training Corps Program

The Naval Reserve Officers Training Corps (NROTC) offers young men and women the opportunity to qualify for a full scholarship and a commission in the Navy or Marine Corps. NROTC midshipmen are required to complete the naval science courses and attend weekly professional seminars. During the summer, NROTC midshipmen participate in active duty at sea or shore-based training cruises for approximately four weeks. Upon receiving the baccalaureate and completing the NROTC program, qualified midshipmen are commissioned as ensigns in the Navy or second lieutenants in the Marine Corps. Students may join the NROTC through any one of the following programs.

Four-Year Scholarship Program—Students enter the NROTC Four-Year Scholarship Program through national competition and are appointed midshipmen in the Naval Reserve. While enrolled, a four-year-scholarship student receives government-provided tuition, fees, books, uniforms, and an allowance of \$200 per month. Upon graduation, students are commissioned with a four-year active duty service obligation. Scholarship Program students must include in their degree program courses in English, calculus, computer science, physics, national security policy, and naval science and participate in three summer training periods of approximately four weeks each.

Two-Year Scholarship Program—Selection for this program is made through national competition, based on the student's academic record, physical qualifications, and an interview. Application should be made by the middle of the fall semester of the student's sophomore year. Selected applicants attend six weeks of instruction at the Naval Science Institute (NSI) at Newport, Rhode Island, during the summer before their third academic year. At NSI, students take courses in naval science, physical fitness, and drill, similar to those required of four-year NROTC students during their freshman and sophomore years. Successful completion of the NSI program qualifies the two-year applicants for appointment as midshipmen in the Naval Reserve and enrollment in the NROTC Scholarship Program. Upon acceptance of this appointment, students receive all the benefits and assume all the obligations of midshipmen in the Four-Year Scholarship Program.

Entering freshmen and transfer students who are awarded NROTC scholarships and plan to live on campus may also be eligible for GW Residence Hall Awards from the University. NROTC scholars with prior experience in the Navy are eligible for awards cover-

ing the nominal charges for on-campus housing and meals. NROTC scholars who are new to the Navy and are majoring in mathematics, chemistry, physics, or a program in the School of Engineering and Applied Science may receive up to \$4,000 to be applied toward the costs of on-campus housing and meals. Further information on these awards is available from the University Office of Admissions.

Four-Year College Program—Students are enrolled in the Four-Year College Program upon acceptance by the Department of Naval Science. Uniforms are provided, and during their junior and senior years, students receive \$200 per month. Students must include in their degree program courses in mathematics, science, and naval science, attend the first class summer at-sea training period, accept a commission in the Naval Reserve or Marine Corps Reserve on graduation with an eight-year active/reserve service obligation, and serve on active duty after graduation for at least three years. Midshipmen who complete one term as College Program students, have a satisfactory academic record, and are physically qualified may compete for a scholarship awarded by the Chief of Naval Education and Training. If awarded, the scholarship will be for the remainder of the student's undergraduate enrollment, up to a maximum of three and a half years; service requirements and benefits are the same as for the scholarship programs.

Two-Year College Program—Application should be made by the middle of the fall semester of the student's second year. Selections are made through the Chief of Naval Education and Training, based on the student's academic record, physical qualifications, and an interview. Those students selected will attend the NSI and upon successful completion may enroll in the program. The benefits and obligations are the same as for the Four-Year College Program.

Requirements for all candidates—Qualifications for acceptable candidates for the Scholarship Program or the College Program include U.S. citizenship, fulfillment of physical requirements, and willingness to participate in required summer training periods and to accept a commission in the Naval Reserve or Marine Corps Reserve when offered.

Enrollment in NROTC is not a requirement for taking naval science courses. Any student enrolled at George Washington University may take naval science courses with the approval of the Professor of Naval Science.

Degree Credit for Naval Science Courses

Columbian College of Arts and Sciences—NSc 126, 160, and 180 are acceptable as electives. Up to 12 credit hours (for NSc 52, 150, 175, and 176) may be accepted as professional electives in Columbian College.

School of Engineering and Applied Science—NSc 126 and 160 may be used for social science credit. Technical elective credit is acceptable as follows: for majors in civil engineering and mechanical engineering—NSc 52, 150, 175; for majors in electrical engineering—NSc 52 and 150; for majors in systems engineering—NSc 150, 151, 175, and 176.

School of Business and Public Management—All NSc courses are applicable to the B.B.A. and B.Accy. degree programs; check with the director of undergraduate advising and student services in SBPM.

Elliott School of International Affairs—NSc 126, 160, 175, 176, and 180 may be used as elective credit in all undergraduate programs.

51 Introduction to Naval Science (3)

A general introduction to the naval profession and to concepts of sea power. The mission, organization, and warfare components of the U.S. Navy and Marine Corps. Overview of officer and enlisted ranks and rates, training and education, and career patterns. Naval courtesy and customs, military justice, leadership, and nomenclature. Professional competencies required to become a naval officer.

52 Naval Ships Systems I (Engineering) (3)

A detailed study of ship characteristics and types, including ship design and control, propulsion, hydrodynamic forces, stability, compartmentation, and electrical and auxiliary systems. Included are basic concepts of the theory and design of steam, gas turbine, and nuclear propulsion.

125 Naval Ships Systems II (Weapons) (3)

Theory and employment of weapons systems, including the processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Fire control systems and major weapons types, including capabilities and limitations. Physical aspects of radar and underwater sound. Facets of command, control, and communications as means of weapons system integration.

- 126 Sea Power and Maritime Affairs (3)**
A survey of the U.S. naval history, with emphasis on major developments. The geopolitical theory of Mahan. Present-day concerns in sea power and maritime affairs, including the economic and political issues of merchant marine commerce and the law of the sea. Naval aspects of U.S. conflicts from the American Revolution to Vietnam.
- 150 Navigation and Naval Operations I (3)**
Students develop practical skills in naval piloting procedures. Charts, visual and electronic aids, and theory and operation of magnetic and gyro compasses; inland and international rules of the nautical road. A broad overview of the celestial coordinate system, including spherical trigonometry and how celestial information can be applied to navigation at sea. Basic principles of environmental factors affecting naval operations.
- 151 Navigation and Naval Operations II (3)**
Relative motion vector analysis theory, formation tactics, and ship employment; practical skills in relative motion problems. Controllable and noncontrollable forces in shiphandling, ship behavior, and maneuvering characteristics; various methods of visual communication, including flaghoist, flashing light, and semaphore.
- 160 Evolution of Warfare (3)**
This course traces the development of warfare, from earliest recorded history to the present, with focus on the impact of major military theorists, strategists, tacticians, and technological developments. The student acquires a basic sense of strategy and develops an understanding of military alternatives and the impact of historical precedent on military thought and actions.
- 175 Leadership and Management (3)**
Organizational behavior, management, and leadership principles in the context of naval organization. The management functions of planning, organizing, and controlling; individual and group behavior in organizations; motivation and leadership. Experiential exercises, case studies, and laboratory discussions. Decision making, communication, responsibility, authority, and accountability.
- 176 Leadership and Ethics (3)**
The interaction of leadership, organizational behavior, and human resource management. Employee interviewing and counseling, performance appraisal, military and civilian law, and managerial ethics and values. This capstone course integrates professional competencies to develop understanding of the issues faced by leaders, managers, and naval officers.
- 180 Amphibious Warfare (3)**
A historical survey of the development of amphibious doctrine and the conduct of amphibious operations. The evolution of amphibious warfare in the 20th century, especially during World War II. Present-day potential and limitations on amphibious operations, including the concept of rapid deployment force.

PEACE STUDIES

Committee on Peace Studies

P. Caws, P. Churchill (*Director*), P.J. Hotez, T.L. Hufford, S. Livingston, P. Palmer, J. Post, M. Price, H. Yeide

Students in Columbian College of Arts and Sciences may earn a minor in peace studies by taking 18 credit hours that include PStd 10 and 190 plus at least one course from each of the following groups.

Peace as a Human Value—Phil 133; Rel 120, 121; WStu 125.

Peace and National and International Systems—Econ 136, 181; Geog 133; Hist 126, 129, 157, 184; PSc 140, 142, 144, 149.

Peace and Interpersonal Relations—EMda 175; Psyc 119, 129, 156; Soc 184.

With approval of the advisor. Selected Topics courses and 700 Series courses in related subjects may be counted toward the minor. An internship in a relevant agency (through SLP 152) may also count for 3 hours of credit, with advisor's prior approval.

- 10 Introduction to Peace Studies and Conflict Resolution (3)** Churchill
Exploration of the nature of war and its causes; peace as a negative concept (absence of war) and as a positive concept (basis for long-range, harmonious

relations in personal communication and international life); and the transition from the negative to the positive concept.

190 Peace Studies Project (3)

Churchill and Staff

Integration of previous academic experience related to peace studies and a groundwork for possible future engagement with peace concerns through graduate work, career choice, or volunteer activities. To be taken in the semester when requirements for the minor are completed. Permission of instructor required.

PHILOSOPHY

University Professors P.J. Caws, K.F. Schaffner

Professors W.B. Griffith, R.P. Churchill (*Chair*)

Associate Professors D. DeGrazia, G. Weiss

Assistant Professors I. Farber, M. Friend, E.J. Saidel, K.P. Dougherty

Assistant Professorial Lecturers R. Carr, M. Monti

Two options are offered for the major in philosophy, both designed to give a broad background in philosophy but with somewhat different emphases. The first option reflects the traditional structure of the discipline and its subfields; it is especially recommended for those considering the possibility of graduate study in philosophy. The second option is designed for those primarily interested in philosophy in its relationship to public affairs.

Bachelor of Arts with a major in philosophy (traditional option)—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite course—Phil 51 or equivalent.
3. Required courses in related areas—6 hours selected from art history, classics (Clas 71, 72, 113, 127), history (Hist 39–40 recommended), humanities, or music history; 3 hours of non-Western religious philosophy selected from Rel 157, 158, 160, 161, 164.
4. Required courses in the major—a minimum of 30 credit hours, including as foundational courses Phil 111, 112, 131, and 152; one course selected from Group A (normative)—Phil 132, 133, 142, 162, 180; one course selected from Group B (epistemological)—Phil 121, 125, 151, 153; two courses selected from Group C (19th- and 20th-century)—Phil 113, 172, 192, 193; the proseminar—Phil 198; plus one elective chosen from 100-, 200-, or 700-level courses, selected in consultation with a departmental advisor.

For students considering continuing in graduate school, it is recommended that they include in their programs of study 6 credit hours of French or German plus Phil 121, 151, 153, 192, and 193.

Bachelor of Arts with a major in philosophy (public affairs option)—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite course—Phil 51 or equivalent.
3. Required courses in related areas—6 credit hours selected from Hist 39–40, 71–72; PSc 105, 106, 107, 110, 114, 115; Econ 11–12, 101–2, 104.
4. Required courses in the major—a minimum of 30 credit hours, including as foundational courses Phil 131, 132; two courses selected from Group A (social, political, and legal)—Phil 125, 133, 135, 142; two courses selected from Group B (historical)—Phil 111 and 112 or Phil 111 or 112 and one course selected from Phil 113, 172, 193; one course selected from Group C (analytical and epistemological)—Phil 121, 151, 152, 192; the proseminar—Phil 198; two electives selected in consultation with the advisor from 100-, 200-, or 700-level courses (Phil 231, 235, 242, 250, 255, 262, 770, 772, 773, 775, and 778 are recommended).

Special Honors—In addition to the general requirements stated under University Regulations, in order to be considered for graduation with Special Honors, a student must (1) have attained a 3.7 grade-point average in the major and at least a 3.25 average overall; (2) submit an honors paper prepared under the supervision of a faculty advisor in the department. Only if a committee of three faculty members in the department approves the honors paper will Special Honors be recommended.

Minor in philosophy—Required: a minimum of 18 credit hours of philosophy courses, including two courses chosen from Phil 51, 111, 112, 113, 172; one course chosen from Phil 131, 132, 133, 135, 142, 162, 180; and one course chosen from Phil 121, 125, 151, 152, 153.

Minor in applied ethics—Required: 18 credit hours of philosophy courses, including Phil 51 or equivalent, and 131 and 132, plus three courses selected from Phil 133, 135, 142, 751 (*Current Issues in Bioethics*); with permission of the instructor, seniors may select from Phil 230, 231, 235, 242, 250, 262, which are listed in the Graduate Programs Bulletin.

- 45 **Introduction to Logic** (3) Friend, Saidel, and Staff
Introduction to methods of deductive and inductive logic with emphasis on sentential calculus. Argument analysis, recognition of fallacies, legal reasoning, and practical applications of logic. (Fall, spring, and summer)
- 51 **Introduction to Philosophy** (3) Friend, Saidel, and Staff
Readings from major philosophers and study of their positions on the most basic questions of human life. Topics include such issues as: What is justice? What is knowledge? What is reality? Does God exist? What is the mind? Do humans have free will? (Fall and spring)
- 62 **Philosophy and Film** (3) Caws
Philosophical problems and theories of perception, meaning, personal identity, and moral agency and their illustration in the context of cinema. Cinema and its derivatives (TV, video) as prime routes to experience of the natural and social worlds in an age of communication. Readings in classical and contemporary philosophy and in film theory; screening of a series of films. (Spring)
- 111 **History of Ancient Philosophy** (3) Dougherty
History of Western philosophy from the Pre-Socratics to the Stoics (6th century BCE to 1st century CE). Major emphasis on the writings of Plato and Aristotle. Among themes to be covered: knowledge and reality, political and moral philosophy. (Fall and spring)
- 112 **History of Modern Philosophy** (3) Churchill, Dougherty
History of Western philosophy of the 16th through 18th centuries; Continental Rationalism and British Empiricism from the scientific revolution through the Enlightenment; major emphasis on Montaigne, Descartes, Spinoza, Locke, Berkeley, Hume, and Kant. Prerequisite: Phil 51 or equivalent. (Spring)
- 113 **19th-Century Philosophy** (3) Staff
European philosophy of the 19th century, with major emphasis on Kant, Hegel, Schopenhauer, Kierkegaard, and Nietzsche. Prerequisite: Phil 51 or equivalent. (Fall)
- 121 **Symbolic Logic** (3) Friend
Analysis and assessment of deductive arguments, using propositional, predicate, and other logics; philosophical basis and implications of logical analysis; metatheory of logic; modal and non-standard logics. Prerequisite: Phil 45 or permission of instructor. (Spring)
- 125 **Philosophy of Race and Gender** (3) Weiss
A theoretical examination of the bodily, social, discursive, and political effects of patriarchy, racism, and classism. (Fall and spring)
- 131 **Ethics: Theory and Applications** (3) Griffith, DeGrazia, Churchill
Examination of leading ethical theories, e.g., utilitarianism, deontology, virtue theory, as well as anti-theory and methodology in ethics. Applications to contemporary problems. (Fall and spring)
- 132 **Social and Political Philosophy** (3) Griffith
Philosophical theories about how economic, political, legal, and cultural institutions should be arranged. Topics include the meaning and significance of liberty, the legitimate functions of government, the nature of rights, the moral significance of social inequality, and the meaning of democracy. (Fall and spring)
- 133 **Philosophy, Nonviolence, and War** (3) Churchill
The course will consider one or more of the following topics: philosophical foundations of pacifism and nonviolent resistance; philosophical inquiry into causes and prevention of war, aggression, genocide; moral constraints on national defense and foreign policy, and the doctrine of just war. (Fall and spring)
- 135 **Ethics in Business and the Professions** (3) Griffith, Monti, and Staff
Basic concepts and theories of ethics for analysis of moral issues arising in business and in professional practice. (Fall and spring)
- 142 **Philosophy of Law** (3) Staff
Systematic examination of fundamental concepts of law and jurisprudence; special emphasis on the relationship between law and morality. (Fall)

- 151 **Science and the Modern World** (3) Farber
Comparison of the cosmological frameworks of Aristotle, Newton, Einstein, and quantum mechanics. Emphasis on changing concepts and methodologies, modes of explanation, and ontological implications. (Fall)
- 152 **Knowledge and Reality** (3) DeGrazia, Farber
Inquiry into the basis and structure of knowledge, the problem of perception and independent reality, the role of language in knowledge, and the meaning and criteria of truth. Prerequisite: Phil 51 or 112 or permission of instructor. (Spring)
- 153 **Mind, Brain, and Artificial Intelligence** (3) Farber
Consideration of the mind-body problem in relation to neurophysiology, cognitive psychology, and artificial intelligence; for example, dualism, functionalism, identity theory, and eliminative materialism. Evaluation of the claims of formalists and neural network researchers to simulate human intelligence. (Spring, odd years)
- 161 **Philosophy and Literature** (3) Weiss
Critical investigation of the sociopolitical commitments that inform the practices of reading and writing as discussed by Sartre, Barthes, Foucault, Baudrillard, and others. Focus on the development of existentialist themes, including authenticity, freedom, temporality, and death in the work of Kafka, Tolstoy, Mann, Woolf, Sexton, and Stein. (Spring)
- 162 **Aesthetics** (3) Weiss
The problem of artistic representation and the nature of aesthetic experience as related to the creation, appreciation, and criticism of art. Special emphasis on nonrepresentational works of art and their interpretation. Prerequisite: Phil 51 or 111 or 112 or 113. (Fall)
- 172 **American Philosophy** (3) Caws, Carr
Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought.
- 180 **Moral Status and Personal Identity** (3) DeGrazia
This course integrates the important philosophical issues of moral status and personal identity, bringing the treatment of these issues to bear on several topics of practical ethical concern. Prerequisite: Phil 131. (Spring)
- 192 **Analytical Philosophy** (3) DeGrazia
The dominant movements of 20th-century Anglo-American philosophy, including logical positivism, British ordinary language philosophy, and neopragmatism, as represented by Russell, G.E. Moore, Wittgenstein, Ayer, Quine, Kripke *et al.* Prerequisite: One other 100-level philosophy course. (Fall)
- 193 **Phenomenology and Existentialism** (3) Weiss, Caws
An intensive exploration of the ontological and existential philosophies of Kierkegaard, Bergson, Husserl, Heidegger, Sartre, Merleau-Ponty, de Beauvoir, and Camus. Prerequisite: One other 100-level philosophy course. (Spring)
- 198 **Proseminar** (3) Staff
Variable topics; preparation and presentation of a major research paper. Open only to philosophy majors, in either the junior or senior year as approved by major advisor. (Spring)
- 199 **Readings and Research** (3) Staff
(Fall and spring)

PHYSICS

Professors D.R. Lehman, B.L. Berman, L.C. Maximon (*Research*), W.C. Parke (*Chair*), R.A. Arndt (*Research*), W.J. Briscoe
Associate Professors N.K. Khatcheressian, E.P. Harper, J.R. Peverley, H. Haberzettl, K.S. Dhuga, C. Bennhold, M.E. Reeves, G. Feldman, I. Strakovsky (*Research*), R.L. Workman (*Research*)
Assistant Professors F.X. Lee, C. Zeng, S. Strauch (*Research*)
Adjunct Professor E.F. Skelton
Associate Professorial Lecturers J.T. Broach, M.F. Corcoran, B.A. Ratnam

Bachelor of Arts or Bachelor of Science with a major in physics—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.

2. Prerequisite courses—Phys 21, 22, 23; Chem 11; Math 31, 32, 33.
3. Required courses in related area—Math 111, 112; one course chosen from CSci 49, 50, 100, 155, or Math 153.
4. Required courses in the major—Phys 151, 161, 164, 165, 167, 195, either 170 or 175, and 181 or equivalent. Recommended electives for students planning graduate study in physics: Phys 152, 163, 166.

Bachelor of Arts with a major in physics and Bachelor of Science in any SEAS undergraduate field—Five-year programs leading to these two degrees are available. Please check with the Department of Physics or with the School of Engineering and Applied Science.

Special Honors—To graduate with Special Honors, a student must meet the eligibility requirements stated under the University Regulations and submit for departmental approval an honors thesis based on a two-semester research project. In addition, the student must have a cumulative grade-point average of at least 3.5 in physics courses and 3.0 overall.

Minor in physics—Required: Phys 21, 22, plus three approved 100-level physics courses.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

ASTRONOMY

- 1 **Introduction to Astronomy I** (3) Maximon, Dhuga, Parke, Skelton
Primarily for non-science majors. Classical through modern astronomy, with introduction to basic principles underlying astronomical systems and observations. Lectures cover electromagnetic radiation, optical instruments, and the solar system. Laboratory (2 hours). Prerequisite: high school algebra. Laboratory fee, \$50. (Fall)
- 2 **Introduction to Astronomy II** (3) Maximon, Dhuga, Parke, Skelton
Primarily for non-science majors. Stellar and extragalactic astronomy, including introduction to quantum aspects of electromagnetic radiation and atomic physics, stellar spectra, and stellar evolution. Laboratory (2 hours). Prerequisite: high school algebra. Laboratory fee, \$50. (Spring)
- 3-4 **Introduction to Astronomy I-II** (2-2) Staff
Same as Astr 1-2 without the laboratory. (Academic year)
- 51 **Modern Cosmology** (3) Parke
A non-mathematical treatment of cosmology, describing the origin and evolution of the universe. Topics include the nature of quasars, pulsars, stellar and galactic black holes, antimatter, gravitational lensing, dark matter, cosmic background radiation, the origin of the elements, big-bang theory, and the future of the universe. Prerequisite: Astr 1 and 2.
- 191 **Space Astrophysics** (3) Corcoran
Physical processes of celestial phenomena as determined from space-based instrumentation. While the entire electromagnetic spectrum is covered, the high-energy (X-ray and gamma ray) region is emphasized. Results from ground-based instrumentation (e.g., radio and optical) may be introduced. Prerequisite: Phys 22 or equivalent. (Fall)

PHYSICS

- 1 **General Physics I** (4) Bennhold, Feldman
Classical physics. Mechanics, including Newton's laws of motion, force, gravitation, equilibrium, work and energy, momentum, and rotational motion; periodic motion, waves, and sound; heat and thermodynamics. Prerequisite: high school trigonometry. Laboratory fee, \$50. (Fall and spring)
- 2 **General Physics II** (4) Feldman, Bennhold
Classical and modern physics. Electrostatics, electromagnetism, direct and alternating current circuits, and electromagnetic radiation; geometrical and physical optics; special relativity; quantum theory; atomic physics; nuclear physics; particle physics; astrophysics and cosmology. Prerequisite: Phys 1. Laboratory fee, \$50. (Fall and spring)

- 7 Music and Physics (4)** Berman
Primarily for non-science majors. A comparative study of music and physics, showing parallels in the history of the two fields and emphasizing those topics in physics related to the theory of music and the production of sound by musical instruments, particularly classical mechanics and wave motion. Prerequisite: high school algebra and geometry. Laboratory fee, \$50.
- 8 Origin and Evolution of Ideas in Physics (4)** Harper
Primarily for non-science majors. The evolution of ideas and their historical continuity in the search for basic physical theories. By presenting the world-views of great physicists of the past, the division of physics into many sub-disciplines is avoided and a humanistic approach is achieved. Prerequisite: high school algebra. Laboratory fee, \$50.
- 21 University Physics I (4)** Khatcheressian, Haberzettl, Lee
Classical mechanics using calculus. Newtonian mechanics: force, momentum, work and energy, mechanical equilibrium, linear, periodic and rotational motion. Gravitation and fields. Atoms, physical properties of matter. Energy transfer and waves, sound. Prerequisite: Math 31; corequisite: Math 32. Laboratory fee, \$50. (Fall and spring)
- 22 University Physics II (4)** Berman, Harper, Lee
Thermodynamics and classical electromagnetism using calculus. Equations of state, heat, and the laws of thermodynamics. Electrostatics, Gauss's law, capacitance, Electric resistance, electric current, Magnetism, Electrodynamics and electromagnetic induction. Maxwell's theory and electromagnetic radiation. Geometric and physical optics. Prerequisite: Phys 21 and Math 32. Laboratory fee, \$50. (Fall and spring)
- 23 University Physics III (3)** Harper, Berman
Modern physics using calculus. Relativity. Wave-particle duality, quantum mechanics. The hydrogen atom, Pauli principle. Quantum statistics and radiation. Quantum theory of the condensed state, superconductivity. Nuclear physics. Applications to astrophysics and nucleosynthesis. General relativity. Cosmological applications, the big bang theory of the Universe. Prerequisite: Phys 22; corequisite: Math 33. (Fall)
- 128 Biophysics: Physics in the Life Sciences (3)** Parke
Physical principles applied to biological systems, medicine, and instrumentation in medicine and biology. Applications include biological transducers, molecular biophysics, bioenergetics, radiation biology, ordering theory, and neural networks. Prerequisite: Phys 1 and 2 or equivalent.
- 151 Intermediate Laboratory I: Techniques and Methods (3)** Feldman, Strauch
Experiments in electromagnetism, classical and quantum mechanics, atomic and nuclear physics with emphasis on experimental methods. Laboratory fee, \$50. (Fall)
- 152 Intermediate Laboratory II: Instrumentation (3)** Feldman, Strauch
Elementary electric and electronic analog and digital circuits. Topics include passive and active components in DC and AC circuits and operational amplifiers, with emphasis on measurement techniques. Laboratory fee, \$50. (Spring)
- 161 Mechanics (3)** Harper, Parke, Reeves
Mechanics of mass points and rigid bodies. Newton's laws, conservation laws, Euler's equations, inertia tensor, small vibrations, and elements of Lagrange's and Hamilton's equations.
- 163 Physical and Quantum Optics (4)** Peverley
Lecture (3 hours), laboratory (3 hours). Wave motion, electromagnetic aspects of light, dispersion of light in media, geometrical optics, polarization and optical properties of crystals, interference, diffraction, lasers, holography. Mathematical tools, including Fourier methods, developed as needed. The quantum description of light complements the classical description. Laboratory fee, \$50.
- 164 Thermodynamics (3)** Skelton
Principles, statistical foundations, and application of equilibrium thermodynamics, reversible processes, thermodynamic potentials, stability and phase changes.
- 165 Electromagnetic Theory I (3)** Peverley
Electrostatics and magnetostatics, electric and magnetic fields in matter, scalar and vector potentials, electromagnetic induction, Maxwell's equations. The

methods of vector and tensor calculus are developed as needed, as are the method of images, Fourier series, and some computational methods. (Fall)

- 166 **Electromagnetic Theory II** (3) Harper
Conservation laws, electromagnetic waves, radiation, relativistic formulation of electrodynamics and potential fields. (Spring)
- 167 **Principles of Quantum Physics** (3) Briscoe, Peverley, Lee
Development of logical structure and experimental bases for modern quantum mechanics. Simple examples worked out to clarify the structure; primary emphasis on conceptual framework and its mathematical realization; careful consideration of the laboratory results to which the theory is a response.
- 170 **Solid-State Physics** (3) Peverley, Reeves, Zeng
Structure of solids, lattices and lattice defects, deformation, vibrational and electronic contribution to specific heats, binding energies, electronic states in metals and semiconductors, magnetic properties of solids, superconductivity. Prerequisite: Phys 167 or permission of instructor.
- 175 **Nuclear Physics** (3) Berman, Briscoe
Introduction to application of quantum physics in the description of nuclei and their interactions. Properties of nuclei, nuclear models, nuclear forces, and nuclear reactions are considered. Specific topics include the deuteron, n-p scattering, the optical model, the shell model, the liquid-drop model, beta decay, fission, and fusion. Prerequisite: Phys 167 or permission of instructor.
- 181 **Computational Physics** (3) Reeves, Dhuga
Topics include celestial mechanics, chaotic systems, fluid dynamics, and other such complex systems that require a computational approach. Prerequisite: three semesters of undergraduate calculus and a complete sequence of calculus-based physics; working knowledge of C or FORTRAN. Laboratory fee, \$50.
- 195 **Undergraduate Research** (3) Staff
Research on problems approved by the faculty. May be repeated once for credit. Laboratory fee, \$50.

POLITICAL COMMUNICATION

See **Media and Public Affairs**.

POLITICAL SCIENCE

University Professor J.N. Rosenau

Professors B. Reich, J.M. Logsdon, H.R. Nau, M.A. East, J.B. Manheim, C. McClintock, P. Reddaway, J.R. Henig, L. Sigelman (*Chair*), M.J. Sodaro, S.L. Wolchik, H. Harding, D. Shambaugh, C.J. Deering, H.B. Feigenbaum, N.J. Brown, H.L. Wolman

Associate Professors R.W. Rycroft, J.H. Lebovic, R.P. Stoker, A. Bowie, S.K. Sell, M. Finnemore, F. Maltzman, J. Goldgeier, D.D. Avant, B. Dickson, P. Wahlbeck, L. Zeng, M.M. Mochizuki, S.J. Balla, S. Binder, S. Wiley

Assistant Professors I. Creppell, J. Willson-Quayle, J.M. Smith, D. Dassa Kaye, P. Brewer, R. Austin, E.Z. Csergo, W.J. Winstead

Bachelor of Arts with a major in political science—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Prerequisite: PSc 1, 2, and 3 (or the equivalent). Six courses in the social sciences, other than political science, to include 6 hours of history or 6 hours of economics. Twelve credit hours of introductory foreign language and statistics are strongly recommended.
3. Required courses in the major: 30 credit hours of 100-level political science courses, including a distribution requirement that consists of 3 credit hours from each of the following groups: Group A (comparative politics)—PSc 130, 131, 167, 170, 173, 177, 179, 180, 181, 183; Group B (American government and politics)—PSc 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 124, 128, 129; Group C (international politics, law, and organizations)—PSc 139, 140, 142, 144, 146, 149, 161, 168, 175, 176, 178, 180, 182, 184; Group D (methodology)—PSc 101, 104; Group E (political thought)—PSc 105, 106, 107, 108, 110.

Every major must complete a proseminar in the junior or senior year. A maximum of two of these may be included in a student's program; such courses do not satisfy the de-

partment's group distribution requirements. A 200-level course may be substituted for the proseminar requirement with the written permission of the instructor and the undergraduate coordinator.

Bachelor of Arts with a major in political science (public policy focus)—Requirements are the same as for the B.A. with a major in political science with the required 30 credit hours of 100-level courses in political science distributed as follows: PSc 104; 9 credit hours in policy-oriented courses to be selected from PSc 112, 117, 122, 124, 146; one policy-oriented proseminar; 3 additional credit hours from each of Groups A, B, C, and E; and 3 credit hours in a political science elective at the 100 level.

No more than 3 hours of service-learning or internship courses may be credited toward the major; these courses do not satisfy the distribution requirement.

Five-Year Bachelor of Arts with a major in political science and Master of Arts in the field of political science—Students interested in this joint degree program should consult the undergraduate program advisor as soon as possible in order to select courses appropriately. The joint degree program is available to students who qualify for Special Honors.

Special Honors—Students may apply for graduation with Special Honors. To qualify, a student must fulfill the general requirements stated under University Regulations, have a GPA in the major of 3.5 or higher, and take PSc 192 in the semester preceding the final semester of study. Those with a GPA in the major of 3.8 and higher will then be recommended for Special Honors. Those with a GPA in the major between 3.5 and 3.7 must complete an independent research project in PSc 192 that has been approved as meriting Special Honors by three members of the Political Science faculty. (Note that PSc 101 or 104 is prerequisite to PSc 192.) Application for Special Honors must be in writing and received by the undergraduate coordinator by the third week of the semester preceding the final semester of study.

Minor in political science—Required: PSc 1, 2, and 3 (or the equivalent) plus 12 credit hours of 100-level political science courses, including a distribution requirement of one course each from Groups D and E. A minimum of 9 credit hours of other social science courses is also required.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Departmental prerequisite: PSc 1 is prerequisite to Group A courses (comparative politics), PSc 2 is prerequisite to Group B courses (American government and politics), and PSc 3 is prerequisite to Group C courses (international politics, law, and organizations). Courses are defined by their group under item 3, above. Elliott School students substitute IAff 5 for PSc 3 as a prerequisite to Group C courses. Qualified juniors and seniors who are not political science majors and who wish to take 100-level PSc courses without having the appropriate prerequisites may do so only with the written permission of the instructor.

- 1 **Introduction to Comparative Politics** (3) Sodaro, Bowie
Concepts and principles of comparative analysis, with an examination of politics and government in selected countries. (Fall and spring)
- 2 **Introduction to American Politics and Government** (3) Sigelman, Maltzman
Structure, powers, and processes of the American political system and the impact on public policy. (Fall and spring)
- 3 **Introduction to International Politics** (3) Goldgeier, Nau, Lebovic
Analysis of world politics, focusing on the role of nation-states and international organizations and on selected foreign policy issues.
- 11–12 **Introduction to Political Behavior** (6–6) Willson-Quayle
Role of personal and social values in political behavior. Fall: Focus on problems in the American liberal tradition. Spring: A comparative perspective on democratic and authoritarian governments in the 20th century. Admission by special selection process. (Academic year)
- 101 **Scope and Methods of Political Science** (3) Lebovic, Wahlbeck, Austin, Wiley
Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. Laboratory fee, \$20. (Fall and spring)
- 104 **Methods of Public Policy Analysis** (3) Stoker, Balla
Introductory overview of the concepts, issues, and techniques of systematic policy analysis and its role in the policy process. (Fall and spring)

- 105-6 **Major Issues of Western Political Thought** (3-3) Creppell
PSc 105: foundations of Western political thought—Plato to Aquinas. PSc 106: history of political thought from the 16th through the late 19th century, as set forth in the works of representative thinkers.
- 107 **20th-Century Political Thought** (3) Creppell
Recent Western political thought; analysis and critique of the legacies of modern political theories and ideologies. (Spring)
- 108 **Marxism-Leninism** (3) Staff
Intensive study of theories and philosophical assumptions of modern communism. Emphasis on Marx, Engels, and Lenin, and consideration of Bernstein, Rosa Luxemburg, Lukacs, Trotsky, Stalin, Khrushchev, and Gorbachev.
- 110 **American Political Thought** (3) Willson-Quayle
Political thought in the U.S. from colonial times to the present as seen through major representative writings. (Spring)
- 111 **State and Urban Politics** (3) Henig
Comparative analysis of context, institutions, processes, and policies of state and urban political systems. (Fall)
- 112 **State and Urban Policy Problems** (3) Henig
Selected issues in state and urban policymaking, with emphasis on urban and metropolitan settings. (Spring)
- 113 **Judicial Politics** (3) Wahlbeck
An examination of judicial process and behavior. Emphasis on judicial selection, decision making, interaction with the political environment, and impact and implementation of decisions.
- 114-15 **U.S. Constitutional Law and Politics** (3-3) Wahlbeck
PSc 114: Separation of powers, federal-state relationships, economic regulation. PSc 115: Political and civil rights. (Academic year)
- 116 **The American Presidency** (3) Maltzman
Examination of the politics of presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influences of personality on performance in office. (Fall and spring)
- 117 **Public Administration and Bureaucratic Politics** (3) Rycroft
Basic concepts in public administration; influence of bureaucratic politics on policy formulation and implementation. Same as PAd 125. (Fall)
- 118 **Legislative Politics** (3) Deering, Maltzman, Binder
Theory, structure, and process of the U.S. Congress, with emphasis on elections, party organization, committees, and floor procedure, in the context of executive-legislative relations and interest-group activities. (Fall and spring)
- 119 **U.S. Political Parties and Politics** (3) Binder
Role of parties as a linkage between mass preferences and government policies. Organization, nominations, voting, and activities in legislative and executive branches. (Fall and spring)
- 120 **Public Opinion and Political Socialization** (3) Brewer
Sources of mass political attitudes and behavior; voting and political campaigning. (Fall)
- 121 **U.S. Political Participation** (3) Austin
Examination of the various forms of American political participation in electoral and governmental politics and their effects on the political process.
- 122 **Science, Technology, and Politics** (3) Logsdon, Rycroft
Multiple impacts of scientific and technological developments on the political systems. Discussion of public policies for support, use, and control of science and technology. (Fall and spring)
- 124 **Issues in Domestic Public Policy** (3) Deering, Stoker, Balla
Examination of the decision-making process and the substance of various issues in domestic public policy in such areas as crime, economics, education, energy, the environment, poverty, and health. (Fall and spring)
- 128 **Media, Politics, and Government** (3) Staff
Same as PCm 128.
- 129 **Television and Politics** (3) Staff
Examination of the impact of television on American politics and society, the nature of coverage of political issues and campaigns, the dynamics of selecting and presenting news stories. Same as PCm/EMda 129. (Fall and spring)

- 130 **Comparative Politics of Western Europe** (3) Feigenbaum and Staff
Comparative political analysis with primary focus on the principal states of Western Europe. (Fall and spring)
- 131 **Comparative Politics of Post-Communist States** (3) Wolchik
Countries covered will include some combination of states formerly part of the Soviet Union. (Fall and spring)
- 139 **International Political Economy** (3) Sell
Analysis of the political aspects of global economic relationships, focusing on such issues as economic hegemony, interdependence, trade relations, development assistance, multinational corporations, and the role of international organizations. (Fall and spring)
- 140 **Theories of International Politics** (3) Nau, Lebovic, Goldgeier, East
Exploration of alternative theoretical approaches to understanding world politics in its historical and contemporary dimensions. (Fall and spring)
- 142 **International Organizations** (3) Finnemore and Staff
Development and operations of the United Nations, regional organizations, and functional international organizations. (Fall and spring)
- 144 **The Politics of International Law** (3) Staff
The political sources and consequences of international law and norms. (Fall and spring)
- 146 **U.S. Foreign Policy** (3) Staff
Constitutional, political, and international factors that determine the formulation, execution, and substance of U.S. foreign policy. (Fall and spring)
- 149 **Military Force and Foreign Policy** (3) Avant
Impact of military considerations on U.S. foreign policy: major problems in national security, e.g., strategic weaponry, military assistance, regional security problems. (Fall and spring)
- 161 **European-Atlantic Relations** (3) Staff
International politics of the North Atlantic area, the European Common Market, and U.S.-European relations. (Fall)
- 167 **Human Rights and Soviet Government** (3) Reddaway
Human rights theory, the various movements for human, religious, civil, political, and other rights that emerged in the USSR from the early 1960s, and the ways in which the authorities responded to these movements. These themes are traced into the post-Soviet period. (Fall)
- 168 **Post-Soviet Foreign Policy** (3) Staff
External problems and policies of Russia and the other successor states of the former USSR (especially the Baltics, Ukraine, and southern rim of the former Soviet Union). (Fall)
- 170 **Comparative Politics of China and Northeast Asia** (3) Dickson
Political institutions and processes of China (including Taiwan), Japan, and Korea since World War II. Influence of indigenous traditions and foreign contacts. (Fall)
- 173 **Comparative Politics of Southeast Asia** (3) Bowie
Comparative analysis of Southeast Asian politics and economics, with principal focus on the capitalist countries of the region. (Spring)
- 175 **International Relations of East Asia** (3) Mochizuki, Shambaugh
Analysis of the foreign policies of selected East Asian countries and the foreign policies of major powers toward the region. (Fall)
- 176 **The Arab-Israeli Conflict** (3) Reich
Origins, evolution, and issues of the Arab-Israeli conflict. (Spring and summer)
- 177 **Comparative Politics of the Middle East** (3) Reich, Brown
Politics of the eastern Arab states, Turkey, Iran, and Israel. (Fall)
- 178 **International Relations of the Middle East** (3) Reich, Brown
Analysis of the regional and international relations of the Middle East. (Spring)
- 179 **Israeli Politics and Foreign Policy** (3) Reich
Examination of the institutions, processes, and issues of Israeli politics and foreign policy. (Fall)
- 181 **Comparative Politics of Middle and Southern Africa** (3) Staff
Comparative analysis of political systems in selected countries of non-Mediterranean Africa. (Fall)

- 182 African International Politics (3)** Staff
Analysis of interstate relations in Africa and of selected aspects of African relations with the outside world. Recommended prerequisite: PSc 181. (Spring)
- 183 Comparative Politics of Latin America (3)** McClintock
Political processes and institutions of selected countries in South America, Central America, and the Caribbean. Emphasis on the possibilities for democracy and revolution. (Fall)
- 184 International Relations of Latin America (3)** McClintock
U.S.-Latin American relations and foreign policies of selected states. (Spring)
- 187 Internship (1 to 3)** Staff
Study of political behavior through internship experience with Congress, executive departments or agencies, politically active private-sector groups, political parties, or electoral campaigns. Admission requires departmental approval. (Fall and spring)
- 190 Selected Topics (3)** Staff
(Fall and spring)
- 191 Independent Study (1 to 3)** Staff
For departmental majors and minors. Prerequisite: 15 credit hours of 100-level political science courses and approval of the undergraduate program advisor and the faculty member who will direct the study.
- 192 Proseminar (3)** Staff
Examination of selected problems in political science. Admission requires departmental approval. Prerequisite: PSc 101 or 104. (Fall and spring)

PSYCHOLOGY

Professors E. Abravanel, J. Miller, L.A. Rothblat, R.A. Peterson (*Chair*), P. Wirtz, D. Reiss, C.K. Sigelman, G. Howe (*Research*), L.R. Offermann, P.J. Poppen
Associate Professors L. Brandt, C.A. Rohrbeck, M.C. Zea, S. Dopkins, S.D. Molock, J.M. Ganiban, D.P. Costanza, E. Davis
Assistant Professors N. Frank, P.J. Moore, C. Beil (*Research*), N. Vasilopoulos, J.W. Philbeck, D.E. Schell, C. Gee, N. Le, A.N. Zucker
Adjunct Assistant Professor K. Ross-Kidder
Lecturer P.J. Woodruff

Bachelor of Arts with a major in psychology—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite course—Psyc 1.
3. Required courses in related areas:
 - (a) Stat 53 or equivalent. Students are encouraged to take a second statistics course to meet the general curriculum requirement in quantitative and/or logical reasoning.
 - (b) 6 credit hours from one of the following departments: Anthropology, Economics, History, Political Science, or Sociology; an additional 3 credit hours from a different one of these departments or from American Studies, Geography, or Philosophy.
4. Required courses in the major—Three survey courses (Psyc 11, 12, 13); 25 credit hours in 100-level psychology courses, including general research methods (Psyc 101); experimental methods (Psyc 105 or 106); experimental (Psyc 118 or 121); history and systems (Psyc 196); and four additional 100-level courses. Psyc 196 should be taken during the senior year. Majors who plan to take Psyc 191, 197, or 198 must take Psyc 101 as a prerequisite.

Special Honors—To qualify for graduation with Special Honors the student must fulfill the general requirements stated under University Regulations, take an honors seminar (Psyc 197) or a 200-level seminar, and complete an independent study project (Psyc 191 or 198) with distinction. The grade-point average in psychology required for graduation with Special Honors is 3.3.

Five-Year Bachelor of Arts/Master of Arts in the field of art therapy—A program leading to the B.A. in the field of fine arts or psychology and the M.A. in the field of art therapy. The first three years of the program consist of undergraduate course work. Application for admission to the M.A. program in art therapy will be made during the second semester of the third year; for admission to the graduate portion of the program, acceptance must be

obtained prior to the start of the fourth year of the program. If acceptance to the M.A. program in art therapy is not desired or not obtained, the requirements for the B.A. degree in the undergraduate field chosen may be fulfilled by the successful completion of appropriate courses during the fourth year of study. If acceptance into the M.A. program in art therapy is obtained, the B.A. will be awarded after the successful completion of the fourth year of the program. Study during the summer following the award of the bachelor's degree and the following academic year would normally complete the M.A. degree requirements. The four art therapy courses taken while an undergraduate count toward satisfaction of M.A. degree requirements.

The following requirements must be fulfilled:

1. Students must meet the general requirements stated under Columbian College of Arts and Sciences. (See the Graduate Programs Bulletin also.)

2. The course requirements for the B.A. in either fine arts or psychology and for the M.A. in art therapy must be met.

Minor in psychology—18 credit hours are required, including Psyc 1, 11, 12, 13, and at least two additional psychology courses other than those in the 190s. Students considering graduate study in psychology are advised to take Psyc 105 or 106, a distribution of courses from the categories listed under the major above, Psyc 196, and an elementary course in statistics.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Departmental prerequisite: Psyc 1 is prerequisite to all psychology courses.

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| 1 | General Psychology (3) | Staff |
| | Fundamental principles underlying human behavior. (Fall and spring) | |
| 11 | Abnormal Psychology (3) | Rohrbeck, Zea, Woodruff, Frank, Le |
| | Causes, diagnosis, treatment, and theories of various types of maladjustments and mental disorders. (Fall and spring) | |
| 12 | Social Psychology (3) | Poppen, Moore |
| | Social foundations of behavior: cognition, motivation, role behavior, communication, small-group processes, and attitudes. (Fall and spring) | |
| 13 | Developmental Psychology (3) | Ganiban and Staff |
| | Introduction to the study of human development; theory and research concerning changes in physical, cognitive, and social functioning and influences on the developing individual. | |
| 101 | Psychology Research Methods (3) | Rohrbeck, Moore |
| | Survey of research designs (e.g., case studies, correlational designs, experiments), methods (e.g., questionnaires, observations), and measurement issues (e.g., reliability and validity). Prerequisite or corequisite: Stat 53. (Fall and spring) | |
| 104 | Ecology and Mental Health (3) | Staff |
| | Examination by field research of the linkages between aspects of the physical environment and mental health. Tutorials, conferences, and student field research projects. (Fall) | |
| 105-6 | Principles and Methods of Psychology (4-4) | Dopkins, Philbeck |
| | Lecture (3 hours), laboratory (3 hours). An experimental approach to understanding behavior: individual and class experiments performed. Psyc 105: overview of sensation and perception. Psyc 106: visual sensation and perception. Laboratory fee, \$30 per semester. (Academic year) | |
| 108 | Humanistic Psychology (3) | Schell |
| | Critical examination of humanistic psychology. Emphasis on role of consciousness in human behavior. Philosophic foundations, existential, phenomenological, and transpersonal psychology. (Fall) | |
| 110 | Perception and Understanding in Children (3) | Abravanel |
| | Concepts and research in the area of developmental psychology; emphasis on the growth and development of thinking, perceiving, and symbolic activity. (Spring) | |
| 112 | Psychology of Adolescence (3) | Ross-Kidder |
| | Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems. (Fall or spring) | |

- 114 **Adult Development and Aging (3)** Staff
Psychological aging and development during the adult years, with an emphasis on theories of adult development and research on changes in cognitive functioning and social adjustment in early, middle, and later adulthood. Prerequisite: Psyc 13.
- 118 **Neuropsychology (3)** Rothblat
Analysis of neural processes underlying behavior. Basic structure and functions of the nervous system, with emphasis on sensory processes, learning and memory, motivation, and emotion. (Fall and spring)
- 119 **Group Dynamics (3)** Offermann
Relationship of the individual to groups, collectivities, and larger social systems. Theory, research, and applications of group and organizational processes. (Fall and spring)
- 121 **Memory and Cognition (3)** Philbeck
An examination of the psychological processes underlying human memory and cognition. Topics cover theoretical and experimental issues involving a range of cognitive function from attention and pattern recognition to learning and memory. (Fall)
- 125 **Cross-Cultural Psychology (3)** Zea
Introduction to the theory, methods, and research of cross-cultural psychology, with emphasis on immigrants and ethnic minorities in the United States and on other cultures. Prerequisite: Psyc 12 or 13. (Spring)
- 128 **Health Psychology (3)** Peterson, Poppen
Current research in the area of health psychology, with special attention to psychological factors related to health and illness, psychological intervention with medical patients, and psychological approaches to illness prevention and health promotion. (Fall and spring)
- 129 **Theories of Personality (3)** Poppen
Survey of personality theories: emphasis on their application to problems of individuals. (Fall and spring)
- 131 **Psychological Tests (3)** Karp
Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, \$25. (Fall and spring)
- 132 **Socialization in Childhood (3)** Ganiban
Examination of primary methods by which the child is shaped in terms of social judgment and self-control; internalization of controls, assimilation of societal values and parenting procedures. Organized by focus on issues according to developmental level.
- 135 **Freud and Modern Psychoanalysis (3)** Staff
Introduction to the work of Freud and his impact on modern psychoanalysis, focusing on the meaning of dreams and the unconscious function of conflict and defense, infantile sexuality and the Oedipus conflict, development of the ego, theory of anxiety and neurosis, and the death instinct. (Spring)
- 144 **Industrial/Organizational Psychology (3)** Offermann, Vasilopoulos
Psychological concepts and methods applied to problems of personnel management, employee motivation and productivity, supervisory leadership, and organizational development. (Fall and spring)
- 150 **Psychology of Sex Differences (3)** Poppen
Relevant biological, psychological, and sociological influences on males and females in the development of sex differences; hormonal differences, gender identity, differential socialization of sons and daughters, masculinity/femininity, cultural evaluation of male and female roles. Survey of relevant psychological theory. Emphasis on empirical research and hypothesis testing. (Spring)
- 151 **Theory and Practice of Women's Leadership (3)** Offermann
Same as WLP 151.
- 154 **Psychology of Crime and Violence (3)** Staff
Examination of many psychological aspects of criminal behavior; personality of criminals and of psychological processes affecting behavior. (Spring)
- 156 **Psychology of Attitudes and Public Opinion (3)** Staff
Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare.

- 170 Clinical Psychology (3)** Zea, Peterson
An exploration of the history, functions, and problems of the clinical psychologist. Assessment, treatment, community approaches, ethics. Prerequisite: Psyc 11, 131.
- 188 Attitudes Toward Death and Dying (3)** Woodruff
Exploration of the many different aspects, attitudes, and experiences associated with the process of death and dying.
- 191 Independent Research (3)** Staff
Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. Prerequisite: Psyc 101. (Fall and spring)
- 192 Field Experience (3)** Abravanel
Senior psychology majors will spend a minimum of six hours a week in a local mental health, rehabilitation, school, or community setting. Students registering for this course must have weekly blocks of time available in their class schedules. (Fall and spring)
- 193 Seminar in Industrial/Organizational Psychology (3)** Offermann, Vasilopoulos
Selected specialized topics in the field of psychology and work behavior, such as human ability and personality, decisions and risk behavior, organizational change, and leadership. May be repeated for credit. Prerequisite: Psyc 144 or permission of instructor.
- 196 History and Systems of Psychology (3)** Staff
Senior capstone course that includes a survey and integration of the major viewpoints and concepts of psychology. Required of psychology majors. (Fall and spring)
- 197 Honors Seminar (3)** Staff
Selected topics in psychology that change each semester. Intended primarily for students in the Special Honors program in psychology. May be repeated once for credit. (Fall and spring)
- 198 Current Research Issues (3)** Staff
Conducted as a seminar. Recent experiments in psychology, including those performed by members of the class; emphasis on student participation. May be repeated once for credit. Prerequisite: Psyc 101.

PUBLIC ADMINISTRATION

Programs in public administration are offered at the graduate level by the School of Business and Public Management. The course listed here is open to undergraduates.

- 125 Managing Public Policy (3)** Staff
Contemporary concepts and issues in public administration and management. Major trends and approaches to governmental administration in the U.S., including the changing federal role, roles of the public sector in relation to the private sector, and managing public agencies at all levels. Same as PSc 117. (Fall and spring)

PUBLIC HEALTH

Programs in public health are available at the graduate level in the School of Public Health and Health Services. The following courses are available to undergraduates in other schools and may be used toward a secondary field in public health and health services.

- 110 Introduction to Global Health and Socioeconomic Development (3)**
Basic concepts of development theory, international health policy, demographic trends, and health promotion; overview of how the intersection between socioeconomic development and global health can be observed, measured, and used for the management of health programs.
- 111 Ecology, Health, and Social Development (3)**
Survey of the intersection between health and social development and environmental trends. Topics on the micro level include household and community sanitation and the interaction between human populations and domestic animals. Topics on the macro level include deforestation, urban contamination, and desertification. Prerequisite: PubH 110.

- 112 **Health, Human Rights, and Displaced Persons (3)**
Concepts of health as a human right, ethics, and the participation of the international community in moving towards health for all. The central focus of analysis is the role of civil and international conflict and the generation of displaced populations.
- 113 **International Public Health Practice (3)**
Global challenges of new and re-emerging infectious diseases and the health of travelers. Use of health information in the context of globalization and public health practice. International aspects of medical and public health training.
- 114 **Impact of Culture Upon Health (3)**
Relationship between cultural values and the development of the modern health systems based on Western models of health practice. Continued reliance upon traditional forms of health care in many societies. Examples of successful incorporation of traditional practices into evolving health care systems will be emphasized.
- 115 **Global Delivery of Health Services (3)**
Introduction to health systems and the basic concepts of health systems administration, financing, and health care reform, using examples from advanced, middle-income, and poor countries.
- 160 **Introduction to Environmental-Occupational Health Sciences (2-3)**
Introduction to principles of environmental and occupational health sciences, including principles of inorganic and organic chemistry.
- 180 **Topics in Public Health (1 to 3)**
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 190 **Introduction to Public Health and Health Services (3)**
Introduction to aspects of public health and health services, including health services administration and policy, maternal and child health, environmental health, and health promotion-disease prevention.
- 191 **Biological Basis of Public Health (3)**
Basic science principles of anatomy, physiology, and pathophysiology and their applications to public health.
- 192 **Introduction to Preventive Medicine (3)**
Introduction to the clinical science basis of preventive medicine, including nutrition, infectious diseases, immunology, and human growth and development. Overview of the goals and methods used for disease prevention.
- 193 **Principles of Health Education and Health Promotion (3)**
Principles and concepts of health education and the role of the health educator in various settings. Foundations of health promotion and communicating health concepts to the public, with a focus on strategies for developing health messages for specific populations.
- 194 **Applications of Health Education and Health Promotion (3)**
Prepares students to act as resource persons in health education. The process of developing health interventions in community settings and providing services to other health professionals, marketing health initiatives, and coordinating health education services in a variety of settings. The role of health educators in addressing health disparities among specific vulnerable groups.

RADIOLOGIC SCIENCES

The Bachelor of Science in Health Sciences in the field of radiologic sciences with a concentration in diagnostic medical sonography is described briefly under the School of Medicine and Health Sciences in this Bulletin. Complete information is available from the School of Medicine and Health Sciences.

RELIGION

University Professor S.H. Nasr
Professors H.E. Yeide, Jr., D.D. Wallace, Jr., A.J. Hildebeitel
Associate Professors P.B. Duff (Chair), R.J. Eisen
Assistant Professor V.K. Urubshurou

Bachelor of Arts with a major in religion—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Rel 1, 2.

3. Required courses in the major—30 credit hours, including at least 21 hours of upper-level courses. Twelve of these hours must be chosen from one of the following religious traditions: Christianity, Hinduism, Islam, and Judaism. Appropriate graduate seminars may be approved as substitutions for advanced-level courses. The program must include Rel 101 and at least one course each in Hebrew Scriptures and in New Testament.

Special Honors are awarded to students who meet the requirements stated under University Regulations and who complete an honors thesis by enrolling in Rel 191.

It is recommended that students include the study of foreign languages in their undergraduate program, including a language crucial to one of the religious traditions. All students expecting to enter graduate school are urged to study French or German.

Minor in religion—Required: a minimum of 18 credit hours in religion, of which at least 6 must be upper-level courses. The minor program will be developed in consultation with the departmental advisor. Rel 101 is strongly recommended for all participating students.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

- 1 **Introduction to World Religions: West** (3) Staff
Examination of the religions of the ancient Mediterranean and the major religions of the West. Religious foundations of Western civilizations. The development of Judaism, Christianity, and Islam and their confrontations with secularization and political upheaval in the modern world. (Fall and spring)
- 2 **Introduction to World Religions: East** (3) Staff
Examination of the major religions of the East and comparison with religions in the West. Approaches to the cross-cultural study of religion. Hinduism, Buddhism, and the religions of Tibet, China, and Japan are studied with respect to their history and their encounter with modernity. (Fall and spring)
- 9 **Bible: Hebrew Scriptures** (3) Duff
The literature, history, and religious thought represented by the Hebrew Scriptures (Old Testament). Continuities and contrasts between Israel and the ancient Near East are considered through study of the world view, oral and literary tradition, main religious ideas, and chief figures and movements of the biblical literature. (Fall and spring)
- 10 **Bible: New Testament** (3) Duff
Literature and history of earliest Christianity in the setting of the religious movements of the Greco-Roman world and developments within Judaism. The meaning of the earliest Christian proclamation about the significance of the life, teaching, and death of Jesus of Nazareth becomes the basis for tracing the formation and expansion of the Christian movement. (Fall and spring)
- 101 **Theories in the Study of Religion** (3) Yeide
Seminar taught jointly by the faculty of the Department of Religion. Analysis of different ways in which religious phenomena can be approached. Readings and discussion of some of the epoch-making books in the development of the study of religion. (Fall)
- 103 **Biblical Issues** (3) Duff
Critical examination of a selected biblical topic or text.
- 104 **Jesus** (3) Duff
Comprehensive study of the life and teachings of Jesus with critical attention to sources. Quest for the historical Jesus.
- 105 **Paul** (3) Duff
Backgrounds of early Christianity, first-century religious and social conditions affecting the spread of Christianity, the life and journeys of Paul, Paul's presentation of the Christian faith.
- 106 **Judaism** (3) Eisen
A survey of Jewish thought and practice from the biblical to the modern period; introduction to the Hebrew Bible, rabbinic Judaism, Jewish philosophy and mysticism, Judaism in the modern period: an examination of the central rituals in Judaism, including Sabbath, dietary laws, and major festivals. (Fall)
- 107 **Rabbinic Thought and Literature** (3) Eisen
An examination of the thought and literature of rabbinic Judaism in its formative period, 100–500 CE, through a close reading of primary texts in translation:

the development of early rabbinic law and theology is explored in the Mishnah, Talmud, and Midrash.

- 111 **Myth, Epic, and Novel (3)** Hiltebeitel
Religious themes and images of the hero and their cultural significance in literature: e.g., Indo-European, Biblical, Babylonian narrative traditions; Greek epic and drama: Dante, Milton, Dostoevsky, Kafka, Hesse, Faulkner, Beckett.
- 112 **Jewish Mysticism (3)** Eisen
A historical treatment of the major forms of Jewish mysticism: the ecstatic schools of Merkavah mysticism, medieval German pietism, and Abraham Abulafia; the theosophic mysticism of medieval French and Spanish Kabbalah, Lurianic Kabbalah, and modern Hasidism; examination of major concepts, such as God, man, Israel, Torah, and redemption, as understood by these schools.
- 113 **Second Temple/Hellenistic Judaism (3)** Duff
History of Judaism from the time of Ezra through the destruction of Jerusalem in 70 CE—canonization of the Pentateuch, Hellenism, Maccabean revolt, growth of sectarian movements, Herod, ferment against Rome in context of Eastern and Western political currents. Use of primary sources, especially the Bible, Josephus, and noncanonical writings.
- 115 **Jewish Philosophy in the Medieval Period (3)** Eisen
An exploration of Jewish philosophical thinking from the close of the rabbinic period to the end of the Middle Ages through an analysis of four major philosophers—Saadia, Judah Halevi, Maimonides, and Gersonides. Topics include the nature of God, creation, divine providence, prophecy, and the rationale for the biblical commandments.
- 116 **Modern Jewish Thought (3)** Eisen
Transformation of community and beliefs among Jews beginning with catalyst of their political emancipation. Responses to beginnings of modernity among Jews in Europe, America, and Israel.
- 120 **The Religions Wage Peace (3)** Yeide
Resources in various world religions that contribute to peacemaking in both inter-personal and political settings. Ways in which the religions have sponsored and/or tolerated violence.
- 121 **Ethics and the World Religions (3)** Yeide
Modern concepts of ethics and their relation to major world religions; religion as stimulus and barrier to moral change; modern moral issues and religious ethics.
- 122 **Christian Ethics and Modern Society (3)** Yeide
Nature and principles of Christian life as developed by the Christian community; problems of personal conduct; application to various social institutions.
- 123 **Issues in Jewish Ethics (3)** Eisen
Exploration of current debates about major ethical issues among Jewish thinkers in the Orthodox, Conservative, and Reform denominations; issues in bioethics, feminism, attitudes towards non-Jews, social action, the ethics of war.
- 134 **The Holocaust in Theology and Literature (3)** Eisen, Ticktin
Theological and literary reactions of Jewish thinkers to the Holocaust; emphasis on evaluating contemporary responses to the Holocaust in light of attitudes toward suffering in the classical Jewish tradition; readings include Fackenheim, Rubinstein, Wiesel, and Appelfeld.
- 143 **Christianity in the Ancient World (3)** Wallace
Rise and development of Christianity in relation to the culture, philosophy, mystery religions, and general religious life of the Greco-Roman world to A.D. 500.
- 144 **Medieval Faith and Symbolism (3)** Wallace
Christian life and thought in the Middle Ages; mystics, saints, popes, and philosophers.
- 145 **Religion in the Renaissance and Reformation (3)** Wallace
Transformation of the Western understanding of human identity and destiny from the end of the Middle Ages to the Age of Reason.
- 146 **Christianity in the Modern World (3)** Wallace
Changes in Christian life and thought since 1700, as seen in theology, literature, political life, and religious institutions.
- 155 **Religion, Myth, and Magic (3)** Staff
Same as Anth 155.

- 156 **The Goddess in India and Beyond** (3) Hiltebeitel
The goddess traditions of Hinduism, with some attention to goddess traditions in the ancient Near East and the Mediterranean. Classical Sanskrit, Tantric, and popular expressions of Hindu goddess worship. Comparative studies and issues of gender.
- 157 **Indian Philosophy and Mysticism** (3) Hiltebeitel
Indian speculative and mystical traditions; late *Vedas*, *Upanishads*, *Bhagavad Gita*, Buddhist, and Hindu soteriological systems.
- 158 **Hinduism** (3) Hiltebeitel
Study of continuity and change in Hinduism, with emphasis on historical development and the consolidating features of the religion. Attention to relations between classical and popular living forms.
- 159 **Mythologies of India** (3) Hiltebeitel
The lore of Indian gods (Vedic, Puranic), heroes (epics), and holy men (Hindu, Buddhist, Jain, Tantric); ties with Indian art, caste, cult, cosmology, and spiritual ideals.
- 160 **Buddhism** (3) Hiltebeitel
Origin, development, and contemporary status of Buddhist life and thought; its impact on Asia.
- 161 **Islam** (3) Nasr
Origin, development, and contemporary status of Islamic life and thought; its impact on the Near East.
- 163 **Islamic Religion and Art** (3) Nasr
Investigation of major forms of Islamic art, such as calligraphy, architecture, and urban design; Quranic chanting, poetry, and music in relation to the principles of Islamic revelation. Same as AH 119.
- 164 **Islamic Philosophy and Theology** (3) Nasr
The major schools of Islamic philosophy and theology, considered in both a morphological and historical manner. The relation between revelation and reason, determination and free will, and divine and human knowledge as well as the relation among science, philosophy, and religion. The development of various schools of thought, from the classical period to the present.
- 165 **Sufism (Islamic Mysticism)** (3) Nasr
The foundation of Sufism in the Quranic revelation, its subsequent development, and its significance within Islamic civilization. Doctrines and practices of Sufism; history of the Sufi orders; Sufi literature, particularly in Arabic and Persian. The influence of Sufism upon social and political life and its state and role in the contemporary world, both Islamic and non-Islamic.
- 172 **Religion in the United States** (3) Wallace
Growth of religious groups and institutions in relation to American culture, development of religious thought, and analysis of the contemporary religious scene.
- 174 **American Judaism** (3) Staff
Religious thought and institutions with emphasis on contemporary Judaism. Mythic and ritual life of American Jews, including responses to Israel, diaspora, the Holocaust, family and community dynamics.
- 181 **Women in Western Religion** (3) Staff
Historical, theological, and ethical investigation of the image and role of women in Judaism and Christianity; special consideration of the Biblical experience, the sexual qualifications for religious office, use of male and female images and languages, and contemporary issues. Same as WStu 181.
- 190 **Selected Topics** (3) Staff
Critical examination of religious phenomena rendered timely by current events or special resources. Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 191 **Senior Honors Thesis** (3) Staff
Required of and open only to undergraduate honors candidates in religion. (Fall and spring)

ROMANCE LANGUAGES AND LITERATURES

Professors I. Azar, J.F. Thibault, G. Ludlow

Associate Professors G.P. Huvé, Y. Captain, J.A. Quiroga, L.R. Vergara (Chair), J.J. Hampton

Assistant Professors E. Echeverria, C. Britt, M. Danan

Instructors M. Ferretti, A. Moron-Pastor, A. Serrano-Ripoll, J. Brant, M. Belenky

Bachelor of Arts with a major in French language and literature, Spanish language and literature, or Spanish-American literature—The following requirements must be fulfilled:

- 1 The general requirements stated under Columbian College of Arts and Sciences.
- 2 Prerequisite courses—Fren/Span 1, 2, 3, 4, 9, 10, 30, or equivalent.
- 3 Required for the majors—Fren 53, 54, and 90; or Span 53, 54, and 90; or Span 55, 56, and 90, plus a minimum of 15 credit hours of 100-level courses, of which at least 9 hours must be in literature. In addition, a proseminar (Fren/Span 199–200) is required. The student is expected to demonstrate a knowledge of his or her field in breadth and depth by passing a comprehensive examination at the end of the senior year.

Minor in French or Hispanic languages and literatures—Required: 9 credit hours chosen from Fren or Span 30, 53, 54, 90 and Span 55, 56; 12 additional hours selected from among French or Spanish courses numbered 8 and above, including at least 6 credit hours of 100-level courses.

Minor in Italian language and literature—Required: 21 credit hours consisting of Ital 9, 10, 30, 53, 54, 120, 131.

Placement Examinations: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FRENCH

Departmental prerequisite: Fren 4 or equivalent is prerequisite to all courses in French, from Fren 9 and above.

- 1 **Basic French I (4)** Danan and Staff
First-semester French. Pronunciation, conversation, reading, composition, grammar. Laboratory fee, \$50. (Fall, spring, and summer)
- 2 **Basic French II (4)** Danan and Staff
Second-semester French. Emphasis on communication, composition, and reading. Prerequisite: Fren 1 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 3 **Intermediate French (3)** Brant and Staff
Third-semester language study. Complete review of grammar. Emphasis on vocabulary acquisition, reading, and composition. Prerequisite: Fren 2 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 4 **Language and Culture (3)** Brant and Staff
Fourth-semester language study. History, geography, and culture of France, with emphasis on conversation and composition. Prerequisite: Fren 3 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 9 **Contemporary Institutions (3)** Huvé and Staff
Fifth-semester language study based on written and video documentation of contemporary society, institutions, everyday life, current events. Emphasis on oral presentation, stressing communicative skills. Prerequisite: Fren 4. Laboratory fee, \$50. (Fall, spring, and summer)
- 10 **Press, Communication, and Politics (3)** Huvé and Staff
Sixth-semester language study utilizing daily and weekly newspapers and magazines. Emphasis on writing skills. Special attention to national and international issues as seen from the perspective of France and the Francophone world. Prerequisite: Fren 9. Laboratory fee, \$50. (Fall, spring, and summer)
- 20 **French Pronunciation (3)** Huvé
The sounds of French. Oral readings, presentations, recitation. Poetry, scenes from plays. Emphasis on phonetics and diction, with attention to accent, rhythm, and intonation. Prerequisite: Fren 10. Laboratory fee, \$50. (Spring)
- 30 **General Readings in French Literature (3)** Thibault and Staff
Readings in prose, poetry, and drama. Introduction to techniques of textual criticism; attention to linguistic and stylistic difficulties in textual analysis. Prerequisite: Fren 10. (Fall and spring)
- 49 **French for Graduate Students (0)** Staff
For graduate students preparing for reading examinations. No academic credit. Tuition is charged at the rate of 3 credit hours. (Fall, spring, and summer)

- 53 **History of French Literature from the Middle Ages Through the 17th Century** (3) Ludlow
Lecture and discussion in French. Development of genre and movements. Selected readings across these periods plus the reading of complete texts of epics, essays, novels, and plays. Prerequisite: Fren 30 or equivalent. (Fall)
- 54 **History of French Literature from the 18th Through the 20th Century** (3) Thibault
Lecture and discussion in French. Philosophical and literary movements of the modern period. Selected readings across the period plus the reading of complete texts of novels and drama. Prerequisite: Fren 30 or equivalent. (Spring)
- 90 **Textual Analysis** (3) Thibault and Staff
Methodology and vocabulary of literary criticism. Application of various principles of textual analysis and critical approaches to literature. Prerequisite: Fren 30 or equivalent. (Spring)
- 108 **Advanced French Grammar and Style** (3) Brant and Staff
Composition, drills, dictations. Translations into French. Study of vocabulary and syntax, with emphasis on stylistic devices. Prerequisite: Fren 10. (Fall)
- 109 **Contemporary France** (3) Huvé and Staff
Emphasis on advanced oral work. Discussion of French culture and civilization, based on contemporary writings and video documents. Prerequisite: Fren 10. Laboratory fee, \$50. (Fall)
- 110 **Business and Commercial French** (3) Huvé
Structure and language of French economic institutions. Discussion of legal, financial, and administrative documents. Oral and written reports. Preparation for the certificate of the Paris Chamber of Commerce. Prerequisite: Fren 10. (Spring)
- 120 **Studies in Medieval French Literature** (3) Staff
Readings and analysis of the major literary texts from the 11th through 15th centuries. *Chansons de geste*, courtly literature, *fabliaux*, drama, lyric and didactic poetry.
- 121 **French Literature of the Renaissance** (3) Staff
The development and maturation of humanistic ideals in France during the 16th century. Rabelais, Montaigne, and La Pléiade.
- 122 **The Age of Classicism** (3) Ludlow
Drama, philosophy, criticism, poetry, and fiction of the 17th century. Study of major social, political, and religious movements: *preciosité*, Baroque, Jansenism, rationalism.
- 123 **The Age of Enlightenment** (3) Ludlow
Study of major novelists, dramatists, *philosophes*, and ideologues of the 18th century. The influence of the works of Montesquieu, Voltaire, Diderot, and Rousseau on European and American thought of the period.
- 124 **19th-Century French Literature** (3) Thibault
Study of the major literary movements of the 19th century from romanticism to symbolism. Emphasis on stylistic analysis of major poems, novels, and dramas.
- 125 **Studies in 20th-Century French Literature** (3) Thibault
The major literary movements of the 20th century: avant-garde, surrealism, existentialism, *nouveau roman*, and *nouveau théâtre*.
- 130 **French Poetry** (3) Thibault
An examination of the creation and evolution of poetic genres. Textual analysis of major French poets.
- 131 **Narratives in French** (3) Ludlow
Study of the various traditions in the novel, from its medieval origins to the present.
- 132 **French Classical Dramatic Tradition** (3) Ludlow and Staff
Study of major dramatic genre. Medieval forms, classic tragedy and comedy: Romantic drama and melodrama, *fin de siècle*, contemporary theatre.
- 133-34 **Special Topics in French Literature** (3-3) Staff
May be repeated for credit provided the topic differs.
- 197 **Independent Study** (arr.) Staff
Admission by permission of department chair and instructor. May be repeated for credit.
- 199-200 **Proseminar** (3-3) Thibault and Staff
Required of all majors; preparation for the major field examination. Conferences, group discussion, practicum; literature in relation to the other arts and

the social sciences. Fren 199: textual analysis, literary criticism, theory, and methods. Fren 200: the concepts of literary history and the history of French literature; periods, authors, genres, topics. (Academic year)

ITALIAN

- 1 **Basic Italian I** (4) Ferretti and Staff
First-semester Italian. Pronunciation, conversation, reading, composition, grammar. Laboratory fee, \$50. (Fall, spring, and summer)
- 2 **Basic Italian II** (4) Ferretti and Staff
Second-semester Italian. Emphasis on communication, composition, and reading. Prerequisite: Ital 1 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 3 **Intermediate Italian** (3) Ferretti and Staff
Third-semester Italian. Complete review of grammar. Emphasis on vocabulary acquisition, reading, and composition. Prerequisite: Ital 2 or equivalent. Laboratory fee, \$50. (Fall)
- 4 **Language and Culture** (3) Ferretti and Staff
Fourth-semester language study. History, geography, and culture of Italy, with emphasis on conversation and composition. Prerequisite: Ital 3 or equivalent. Laboratory fee, \$50. (Spring)
- 9 **Contemporary Institutions** (3) Ferretti and Staff
Fifth-semester language study based on written and video documentation of contemporary society, institutions, everyday life, current events. Emphasis on oral presentation, stressing communicative skills. Prerequisite: Ital 4. Laboratory fee, \$50.
- 10 **Press, Communication, and Politics** (3) Ferretti and Staff
Sixth-semester language study, utilizing daily and weekly newspapers and magazines. Emphasis on writing skills. Special attention to national and international issues as seen from the perspective of Italy. Prerequisite: Ital 9. Laboratory fee, \$50.
- 30 **General Readings in Italian Literature** (3) Ferretti
Readings in prose, poetry and drama. Introduction to techniques of textual criticism; attention to linguistic and stylistic difficulties in textual analysis. Prerequisite: Ital 10. (Fall)
- 53 **History of Italian Literature from the Middle Ages Through the 17th Century** (3) Ferretti and Staff
Lecture and discussion in Italian. Development of genre and movements. Selected readings across these periods plus reading of complete texts of epics, essays, novels, and plays. Prerequisite: Ital 10 or equivalent. (Fall)
- 54 **History of Italian Literature from the 18th Through the 20th Century** (3) Ferretti
Lecture and discussion in Italian. Philosophical and literary movements of the modern period. Selected readings across the period plus the reading of complete texts of novels and drama. Prerequisite: Ital 10 or equivalent. (Spring)
- 108 **Advanced Italian Grammar and Style** (3) Ferretti
Compositions, drills, dictations. Translations into Italian. Study of vocabulary and syntax with emphasis on stylistic devices. Prerequisite: Ital 10. (Fall)
- 120 **Studies in Medieval and Early Renaissance Literature** (3) Ferretti
Works by Dante, Petrarca, and Boccaccio. Emphasis on structure, rhetorical features, and problems of narrative organization. Specific attention to historical and ideological aspects of the works as well as to cultural influence.
- 131 **The Italian Novel** (3) Ferretti and Staff
A reading of the most important Italian novelists of the 19th and the 20th centuries: Manzoni, Verga, Bassani, Calvino. Study of the relations of each work to its social and cultural context and to the novel as a genre.
- 197 **Independent Study** (arr.) Staff
Admission by permission of department chair and instructor. May be repeated for credit.

PORTUGUESE

- 1 **Basic Portuguese I** (4) Staff
First-semester Portuguese. Pronunciation, conversation, reading, composition, grammar. Laboratory fee, \$50. (Fall)

- 2 Basic Portuguese II (4)** Staff
Second-semester Portuguese. Emphasis on communication, composition, and reading. Prerequisite: Port 1 or equivalent. Laboratory fee, \$50. (Spring)
- 3 Intermediate Portuguese (3)** Staff
Third-semester Portuguese. Complete review of grammar. Emphasis on vocabulary acquisition, reading, and composition. Prerequisite: Port 2 or equivalent. Laboratory fee, \$50. (Fall)
- 4 Language and Culture (3)** Staff
Fourth-semester language study. History, geography, and culture of Portugal and Brazil. Emphasis on conversation and composition. Prerequisite: Port 3 or equivalent. Laboratory fee, \$50. (Spring)
- 9 Contemporary Institutions (3)** Staff
Fifth-semester language study based on written and video documentation of contemporary society, institutions, everyday life, current events. Emphasis on oral presentation, stressing communicative skills. Prerequisite: Port 4. Laboratory fee, \$50.

SPANISH

Departmental prerequisite: Span 4 or equivalent is prerequisite to all courses in Spanish, from Span 9 and above.

- 1 Basic Spanish I (4)** Echeverria and Staff
First-semester Spanish. Pronunciation, conversation, reading, composition, grammar. Laboratory fee, \$50. (Fall, spring, and summer)
- 2 Basic Spanish II (4)** Echeverria and Staff
Second-semester Spanish. Emphasis on communication, composition, and reading. Prerequisite: Span 1 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 3 Intermediate Spanish (3)** Serrano-Ripoll and Staff
Third-semester Spanish. Complete review of grammar. Emphasis on vocabulary acquisition, reading, and composition. Prerequisite: Span 2 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 4 Language and Culture (3)** Serrano-Ripoll and Staff
Fourth-semester language study. History, geography, and culture of Spain, with emphasis on conversation and composition. Prerequisite: Span 3 or equivalent. Laboratory fee, \$50. (Fall, spring, and summer)
- 9 Contemporary Institutions (3)** Moron-Pastor and Staff
Fifth-semester language study based on written and video documentation of contemporary society, institutions, everyday life, current events. Emphasis on oral presentation, stressing communicative skills. Prerequisite: Span 4. Laboratory fee, \$50. (Fall, spring, and summer)
- 10 Press, Communication, and Politics (3)** Moron-Pastor and Staff
Sixth-semester language study utilizing daily and weekly newspapers and magazines. Emphasis on writing skills. Special attention to national and international issues as seen from the perspective of Spain and Spanish America. Prerequisite: Span 9. Laboratory fee, \$50. (Fall, spring, and summer)
- 30 General Readings in Spanish Literature (3)** Echeverria and Staff
Readings in prose, poetry, and drama. Introduction to techniques of textual criticism; attention to linguistic and stylistic difficulties in textual analysis. Prerequisite: Span 10. (Fall and spring)
- 49 Spanish for Graduate Students (0)** Staff
For graduate students preparing for reading examinations. No academic credit. Tuition is charged at the rate of 3 credit hours. (Fall, spring, and summer)
- 53 History of Spanish Literature from the Middle Ages Through the Siglo de Oro (3)** Hampton and Staff
Lecture and discussion in Spanish. Development of genre and movements. Selected readings across the period plus the reading of complete texts of epics, essays, novels, and drama. Prerequisite: Span 30 or equivalent.
- 54 History of Spanish Literature from the 18th Through the 20th Century (3)** Hampton and Staff
Lecture and discussion in Spanish. Philosophical and literary movements of the modern period. Selected readings across the period plus the reading of complete texts of novels and drama. Prerequisite: Span 30 or equivalent. (Spring)

- 55 **History of Spanish-American Literature from the Conquest Through Romanticism** (3) Captain, Quiroga
Lecture and discussion in Spanish. A survey course that covers all genres and focuses on major trends and issues. Prerequisite: Span 30 or equivalent. (Fall)
- 56 **History of Spanish-American Literature from Modernism to the Present** (3) Quiroga, Captain
A survey course that covers all genres and focuses on major trends and issues. Prerequisite: Span 30 or equivalent. (Spring)
- 80 **Madrid Study Center: Language and Culture** (3)
Offered through the Madrid Program. May be repeated for credit.
- 90 **Textual Analysis** (3) Vergara and Staff
Methodology and vocabulary of literary criticism. Application of various principles of textual analysis and critical approaches to literature. Prerequisite: Span 30 or equivalent. (Spring)
- 108 **Advanced Spanish Grammar and Style** (3) Moron-Pastor, Serrano-Ripoll
Composition, drills, dictations. Translations into Spanish. Study of vocabulary and syntax, with emphasis on stylistic devices. Prerequisite: Span 10. (Fall)
- 109 **Contemporary Spain and Latin America** (3) Echeverria and Staff
Emphasis on advanced oral work. Discussion of Hispanic culture and civilization, based on contemporary writings and video documents. Laboratory fee, \$50. Prerequisite: Span 10. (Fall)
- 110 **Business and Commercial Spanish** (3) Echeverria and Staff
Structure and language of Latin American and Spanish economic institutions. Discussion of legal, financial, and administrative documents. Oral and written reports. Prerequisite: Span 10. (Spring)
- 120 **Studies in Medieval Spanish Literature** (3) Azar
Reading and analysis of the major literary texts from the 11th through the 15th century. Attention paid to linguistic aspects of Old Spanish.
- 121 **Studies in Golden Age Literature** (3) Azar
Reading and analysis of the major texts of the 16th and 17th centuries. Lyric poetry and the "invention" of subjectivity. Prose fiction and the structure of life. Golden Age *Comedia* and the relation between private and public life. Humanism and the Classical Tradition. The invention of the press, the status of writing, and the new culture of the book. The (post)modernity of Golden Age literature.
- 122-23 **Cervantes' Don Quijote and the Rise of the Novel** (3) Azar
The novel as a genre. Literature as an institution: Western literary tradition constructed and deconstructed. The structure of narrative and the question of truth. Literature and life.
- 124 **18th- and 19th-Century Spanish Literature** (3) Britt
Readings in major 18th- and 19th-century texts. Romanticism, *Costumbrismo*, realism, naturalism.
- 125 **Contemporary Spanish Literature** (3) Britt
Prose, poetry, and drama of the 20th century. Generations of 1898, of 1927, the novel after the Spanish Civil War.
- 130 **Poetry of Spain and Latin America** (3) Azar, Quiroga
Major classical and modern poetic traditions and genres. Textual analysis of major Spanish works.
- 131 **Narratives of the Hispanic World** (3) Vergara, Britt
Emphasis on the novel and short story.
- 132 **Theatre and the Hispanic Experience** (3) Azar, Vergara
Study of major dramatic traditions in Spain and Spanish America. Emphasis on the *commedia*.
- 133-34 **Special Topics in Spanish and Spanish-American Literature** (3-3) Staff
May be repeated for credit provided the topic differs.
- 140 **Latin American Women Writers** (3) Vergara
Works of well-established women writers (such as Sor Juana Ines de la Cruz, Gabriella Mistral, and Luisa Valenzuela) and those of more recent writers (such as Elena Poniatowska, Diamela Eltit, Ana Lydia Vega, Cristina Peri-Rossi, and Laura Esquivel) are discussed in relationship to feminist principles of criticism.
- 145 **Modern Spanish-American Poetry** (3) Quiroga
Poetry after Modernism; the various metric patterns that characterize the work of authors such as Agustini, Mistral, Huidobro, Villaurrutia, Vallejo, Borges, Neruda, Parra, Cardenal, Guillén, Lezama, and Palés.

- 146 **Spanish-American Short Fiction** (3) Captain, Vergara
Analysis of short stories and short novels by writers such as Quiroga, Rulfo, Fuentes, Cortázar, Zapata Olivella, Arenas, and Borges.
- 147 **Spanish-American Polemics** (3) Quiroga, Captain
Origin and development of writing in Spanish America and its relationship to the creation of national or nationalist discourse. Readings include excerpts concerning the New World and its inhabitants, the question of independence (cultural and economic), and the discourse for and against slavery. The focus is on the 19th century and the essay.
- 148 **New Narrative in Spanish America** (3) Captain, Vergara
A study of experimental fiction in Spanish America, with a focus on the literature of the mid-1960s through the 1970s. Precursors of and successors to the new narrative.
- 149 **Spanish-American Colonial Literature** (3) Quiroga, Captain
Focus on the literature written before independence, with an incursion into Spanish Medieval and Renaissance literature.
- 150 **Spanish-American Romanticism and Modernism** (3) Quiroga, Vergara
Key writers and trends that characterize Romanticism and Modernism. Readings include works from the period of the French and American Revolutions: Andrés, Sarmiento, Olmedo, Heredia, Darío, Martí, and Lugones.
- 180 **Madrid Study Center: Advanced Language, Culture, and Literature** (3)
Offered through the Madrid Program. Topics vary. May be repeated for credit.
- 197 **Independent Study** (arr.) Staff
Admission by permission of department chair and instructor. May be repeated for credit.
- 199-200 **Proseminar** (3-3) Staff
Required of all majors; preparation for the major field examination. Conferences, group discussion, practicum; literature in relation to the other arts and the social sciences. Span 199: textual analysis, literary criticism, theory, and methods. Span 200: the concepts of literary history and the history of Spanish literature; periods, authors, genres, topics. (Academic year)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

This interdisciplinary course is offered under the joint auspices of the departments in the School of Engineering and Applied Science.

- 1 **Engineering Orientation** (1) Tong, Heller
Introduction to careers in engineering and computer sciences, University resources, and computer skill development. Emphasizes teamwork skills by applying them to several design projects. (Fall)

SERVICE-LEARNING PROGRAM

- 154 **Independent Study** (1 to 6) Staff
Fieldwork combined with academic study, involving field placements and complementary academic program of study, under the supervision of an appropriate faculty member. Students must contract with the agency, the faculty member, and the Service-Learning Program in Columbian College. Graded on a Pass/No Pass basis only. Admission by permission of director. (Fall and spring)

700 SERIES

The 700 Series is made up of experimental or special courses that are on the cutting edge of the academic endeavor. Often, courses in the 700 Series focus on interdisciplinary or very current issues in a field. Because 700 Series courses change each semester, students should consult the *Schedule of Classes* for offerings. Courses are listed with the participating departments; course descriptions appear in a specially designated section of the Schedule.

Courses numbered 701 are in general studies, 721 courses are interdepartmental, 751 courses are interschool, and 770s and 780s are taught by University Professors and are listed in this Bulletin under the designation of University Professors. The program is coordinated by the Director of Summer, Special, and International Programs.

SIGN LANGUAGE

See **Teacher Preparation and Special Education.**

SLAVIC LANGUAGES AND LITERATURES

See **German and Slavic Languages and Literatures.**

SOCIOLOGY

University Professor A. Etzioni

Professors P.H.M. Lengermann (*Research*), R.A. Wallace, W.J. Chambliss, J.L. Tropea,

J. Austin (*Research*), S.A. Tuch, R. Weitzer, R.J. Cottrol, G.D. Squires (*Chair*)

Associate Professors H. Nashman, C. Deitch, M.A.P. Saunders

Assistant Professors S.R. Friedman, C.E. Kubrin, S. Cohen, I. Kennelly, D.S. Eglitis

Adjunct Professor J.M. Billson

Adjunct Associate Professors R.B. Zamoff, R. Whitaker, L. Joseph

Adjunct Assistant Professors N.A. Briggs, J.F. Markey, P.A. Konwerski, M. Mashayekhi

Assistant Professorial Lecturer K. Mulvey

Committee on Criminal Justice

R. Weitzer (*Chair*), K.E. Newcomer, W.F. Rowe, L. Sigelman, A.M. Yezer

Bachelor of Arts with a major in sociology—The following requirements must be fulfilled:

1. The general requirements stated under **Columbian College of Arts and Sciences.**

2. Prerequisite course—Soc 1.

3. Required courses in the major—Soc 101, 102, 103, 104, 197, and five additional 100-level sociology courses including at least one course chosen from the 160s group and one course chosen from the 170s group. Soc 101, 102, 103, and 104 should preferably be taken by the junior year.

Bachelor of Arts with a major in criminal justice—The following requirements must be fulfilled:

1. The general requirements stated under **Columbian College of Arts and Sciences.**

2. Prerequisite course—Soc 1.

3. Required courses in related areas—PAd 125 and two of the following course sequences: ForS 103–4, Econ 11 and 167, PSc 2 and 113 or 115.

4. Required courses in the major—Soc 3, 101, 102, 136, 145, 192, and one course chosen from Soc 135, 167, 178, 184, 189, and Psyc 154. Soc 101 and 102 should be taken by the junior year.

Bachelor of Arts with a major in human services—The following requirements must be fulfilled:

1. The general requirements stated under **Columbian College of Arts and Sciences.**

2. Prerequisite course—Soc 1.

3. Required courses in related areas—Phil 135 and one course chosen from Comm 40, 41, 42, 120; 15 credit hours of 100-level courses in one other field of study, as approved by the major advisor.

4. Required courses in the major—HmSr 152, 171, 172, 176, 177, 182, 195; Soc 101, 104, 112.

Five-Year Bachelor of Arts with a major in criminal justice and Master of Public Administration—Interested students should contact their advisor about this combined degree program. Application to the graduate portion of the program is made after the fifth semester (at completion of 75 credit hours, 45 of which have been completed at GW with a grade-point average of 3.5). Students must be accepted for the graduate portion of the combined degree prior to the start of the seventh semester. All requirements listed under the Bachelor of Arts in the field of criminal justice, above, are to be completed, with the following required courses in public administration taken during the fourth year: PAd 201, 202, 203, and 204. During the fifth year, PAd 205, 206, 208, and 209, plus three courses in one of any of the fields of concentration in public administration and two electives, must be completed. See the Master of Public Administration under the School of Business and Public Management in the Graduate Programs Bulletin.

Special Honors—In addition to meeting the general requirements stated under University Regulations, a candidate for graduation with Special Honors in sociology or criminal justice or human services must maintain a 3.3 grade-point average in required courses in

the major, must be registered in Soc 195 or HmSr 193 by fall of their senior year, and must complete a senior honors thesis.

Minor in sociology—A minimum of 15 hours of course work, including Soc 1 and 101 or 103 or 104, plus 9 hours of electives in sociology courses at the 100 level, excluding Soc 192 and 197.

Minor in criminal justice—A minimum of 18 hours of course work, including Soc 1, 3, 136, and 145, plus 6 hours chosen from Soc 167, 178, 184; Psyc 154; ForS 103; PSc 113 or 115; and PAd 125.

Minor in human services—A minimum of 18 hours of course work, including HmSr 152 (6 hours), 176, 182, 195, and an elective (Soc 1 is recommended) chosen with permission of advisor.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Note: A student majoring in sociology may not declare a second major or a minor in criminal justice, nor vice versa.

Departmental prerequisite: Soc 1 is prerequisite to all 100-level sociology courses.

SOCIOLOGY

- 1 **Introduction to Sociology (3)** Staff
A broad overview of the "sociological imagination" as a way of understanding social events and personal experience; sociology's place among the social sciences; basic elements of sociological perspectives. (Fall and spring)
- 2 **Social Problems in American Society (3)** Squires, Kubrin
Introduction to critical social problems (e.g., unemployment, poverty, crime, discrimination) in the United States and how they are, and have historically been, researched and understood by the academic and non-academic worlds. Concepts, theories, and methods of sociological research; examination of the field of social problems generally, emphasizing contemporary social problems.
- 3 **Introduction to Criminal Justice (3)** Kubrin, Weitzer
An introduction to the study of criminal justice. The historical development of criminal justice and its evolution into modern legal systems. The impact of different forms of criminal justice on society and the individual. (Fall)
- 101 **Social Research Methods (3)** Kubrin, Friedman, Tuch
Lecture (3 hours), laboratory (1 hour). Introduction to basic research methods in sociology. Topics include research design, sampling, measurement, and analysis of survey data via computer application. (Fall)
- 102 **Techniques of Data Analysis (3)** Kubrin, Friedman, Tuch
Continuation of Soc 101. Examination of a range of topics in the statistical analysis of sociological data, with a strong emphasis on computer applications. Prerequisite: Soc 101. (Spring)
- 103 **Classical Sociological Theory (3)** Wallace, Kennelly, Eglitis
Development of social thought from 1840 to 1940. Major emphasis on Comte, Marx, Durkheim, Simmel, Weber, Cooley, and Mead. (Fall)
- 104 **Contemporary Sociological Theory (3)** Wallace, Kennelly, Eglitis
A systematic study of the work of selected social theories of the post-World War II era. Emphasis on Parsons, Merton, Mills, Collins, Habermas, Giddens, Smith, Homans, Blau, Blumer, Goffman, Berger, Garfinkel. (Spring)
- 111 **Qualitative Research (3)** Chambliss, Weitzer
Examination of the logic of qualitative inquiry and techniques of qualitative data collection and analysis. Various research methods are covered, with an emphasis on intensive interviewing, participant observation in field settings, and focus groups. (Spring)
- 112 **Evaluation Research (3)** Cohen
Introduction to the evaluation of public programs designed to address the impact of social problems on individuals, households, and larger collective groups. Application of social science theory and research methods to the assessment of impact benefits and costs of such programs. (Fall)
- 135 **Youth and Delinquency (3)** Chambliss, Kubrin, Tropea
Analysis of historical, economic, and social conditions affecting both difficulties in socializing youth and the evolution of the state's formal systems of control. (Spring)

- 136 **Criminology** (3) Chambliss, Tropea, Weitzer
Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions. Analysis of the historical, social, legal, and cultural conditions affecting the nature of crime, criminality, and the development of state responses made to it. (Spring)
- 145 **Introduction to Criminal Law** (3) Chambliss, Tropea
Introduction to the sources and fundamental principles of criminal law and procedure using major sociological perspectives as interpretive tools. (Spring)
- 161 **Sociology of Complex Organizations** (3) Tropea
Review of sociological approaches to the study of complex organizations. Selected and comparative emphasis on bureaucratic organization in both government and private sectors. (Spring)
- 162 **Sociology of the Family** (3) Staff
An examination of the stages of family life: birth, childhood, premarital relationships, marriage and sex roles in marriage, retirement and old age. Special emphasis on development and maintenance of interpersonal relations. (Fall)
- 163 **Sociology of Education** (3) Tropea, Wallace
Analysis of educational systems from historical-comparative, institutional, and micro-sociological perspectives. Emphasis on educational systems in relation to the religious, cultural, economic, and political forces shaping their character: the role of formal education in modern society. (Spring)
- 164 **Sociology of Medicine and Health Care** (3) Briggs
Sociological perspectives on medicine and health care. Emphasis on social, economic, and political processes related to health care, medical occupations, professionals, medical organizations, and delivery of health care services. (Fall)
- 165 **Sociology of Religion** (3) Wallace, Yeide
Analysis of the relationships between religion and society. Topics include the contribution of religion to social integration, social change, and social inequality; the nature of religious experience; religious symbolism; the basis of religious communities. (Spring)
- 166 **Comparative Family Systems** (3) Staff
An examination of the variety of family patterns that have existed or presently exist around the world. The course examines how and why family patterns vary and how economic development, revolutions, and other change forces affect family life. (Spring)
- 167 **Sociology of Law** (3) Chambliss, Tropea
Law as a social phenomenon and agency of social control. Special emphasis is placed on study of the sources of and challenges to the legitimacy of law. (Fall)
- 168 **Economic Sociology** (3) Tropea
Sociological approach to the study of micro- and macroeconomic behavior. Historical and comparative analyses informed by the literature of sociology and other social sciences. Critical review of economic policy in developing, post-communist and advanced market societies. (Spring)
- 169 **Urban Sociology** (3) Friedman, Squires
Analysis of the city from a sociological perspective. Topics include a focus on the social change and inequality associated with urban growth, neighborhood change, and suburbanization; residential segregation; the issue of whether community exists in cities; urban poverty and homelessness. Prerequisite: Soc 1.
- 170 **Class and Inequality** (3) Friedman, Tuch
Analysis of distribution of resources and opportunities for participation, education, and social mobility. International comparisons; analysis of public policies that affect these distributions. (Fall)
- 173 **Social Movements** (3) Staff
General survey of the various forms of collective behavior (fads, panics, riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions. (Spring)
- 175 **Sociology of Sex and Gender** (3) Wallace, Kennelly, Eglitis
The roles of women and men from social structural and social psychological perspectives. Analysis of gender inequality in such areas as the family, the workforce, the media, politics, law, religion, and education.

- 178 **Deviance and Control** (3) Tropea, Weitzer, Kubrin
Examination of deviant behavior and its control. Topics include theoretical perspectives, changing societal conceptions of deviance, deviant behavior and identity, and the dynamics of control agencies. (Fall)
- 179 **Race and Minority Relations** (3) Tuch, Weitzer
Analysis of relationships between dominant and minority groups in society; nature and range of problems; analysis of the phenomenon of prejudice. (Spring)
- 181 **Special Topics in Sociology** (3) Staff
Analysis and examination of various processes in society of general importance to the field of sociology, e.g., social conflict, socialization, social change. Topic changes each semester; may be repeated once for credit. (Fall and spring)
- 184 **Violence and the Family** (3) Tropea, Weitzer
Comparative approach to power and violence in family systems. Analysis of devaluation of family relations. Critical survey of explanations of violence and responses made to it. (Fall)
- 189 **Special Topics in Criminal Justice** (3) Staff
Analysis and examination of various processes and problems of general importance to the field of criminal justice. Topic changes each semester; may be repeated once for credit. (Fall and spring)
- 192 **Fieldwork in Criminal Justice** (9) Chambliss, Weitzer
Development of experience-based perspective on criminal justice through readings, seminar, and field placement in legislative, policymaking, and juvenile and criminal justice institutions. Required of criminal justice majors nearing graduation; field placement required before registration. (Fall and spring)
- 195 **Research** (1 to 3) Staff
Independent study and special projects. Open only to selected undergraduate students with promising academic records. Prerequisite: Students must submit a written proposal of their plan of study for the approval of the staff member of the department who will be directing the research. May be repeated for credit to a maximum of 6 credits. (Fall, spring, and summer)
- 197 **Fieldwork in Sociology** (6) Tropea
Open to juniors and seniors majoring in sociology. Students spend at least 10 hours a week in an approved community agency or organization in metropolitan Washington. Field placement in consultation with a faculty member is required before registration. Weekly seminar meetings, reports, a journal, and a written paper are required. (Fall and spring)

HUMAN SERVICES

- 133 **Supervised Experience in Human Services** (3 to 6) Nashman
Fieldwork, internship, and instructional practice. Admission by permission of instructor. (Fall and spring)
- 152 **Issues in Human Services** (1 to 6) Nashman
An inquiry into the values and methods of practitioners in the field of human services, linking academic study and field experience. Admission by permission of instructor. (Fall and spring)
- 171 **Introduction to Human Development I** (3) Staff
Lectures and fieldwork. All aspects of development through adolescence; child study techniques. Two to three hours weekly field experience in appropriate setting. (Fall)
- 172 **Introduction to Human Development II** (3) Saunders
Adult development from young adulthood to old age. Dominant psychological, social, and physical competencies; motivational changes; coping styles; maladaptive behavior. Three hours weekly field experience in appropriate agency setting. (Spring)
- 176 **Program Planning and Development for Service Agencies** (3) Cohen
Examination of program planning and development activities essential to human service agencies. Through case studies and on-site field experiences, students examine and analyze a variety of processes in which agency needs are assessed and programs planned. Prerequisite: Status as a human services major or minor or permission of the instructor. (Fall)

- 177 **Human Services and Community: Empowerment for Social Change (3)** Konwerski
The community as a laboratory for the study of contemporary issues in philanthropy aimed toward social change. Through readings, observations, and group internships, students participate in various aspects of community service. (Fall)
- 182 **Organization and Administration in the Human Services (3)** Cohen
Introduction to organizational theory and program administration in non-school agencies, staff recruitment and development, fiscal operations, personnel and program supervision, facilities, and maintenance of effective community relations. Prerequisite: Status as a human services major or minor or permission of the instructor. (Spring)
- 193 **Research and Independent Study (arr.)** Nashman
Individual research under guidance of a staff member. (Academic year)
- 195 **Seminar in Human Services: Current Issues (3)** Konwerski
Analysis of selected issues in human services. Each student conducts an investigation of an identified problem in human services and completes a skill assessment project. Admission by permission of instructor. (Spring)
- 198 **Topics in Human Services (1 to 3)** Nashman
Topics to be announced in the *Schedule of Classes*. May be repeated for credit.

SPANISH

See Romance Languages and Literatures.

SPECIAL EDUCATION

See Teacher Preparation and Special Education.

SPEECH AND HEARING SCIENCE

Professor C.W. Linebaugh

Associate Professors M.D.M. Brewer, J.R. Regnell, G.M. Schulz (Chair)

Assistant Professors L. Bland-Stewart, L.R. Goldberg, S. Martinez, N.S. Richards

Assistant Professorial Lecturer M.E. Moody

Bachelor of Arts with a major in speech and hearing science—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Required courses in related areas—Auth 4 or 161; Psyc 121 and 131 (or equivalents), plus 12 additional credit hours of 100-level courses selected from related areas as approved by the major advisor.
3. Required courses in the major—SpHr 11, 71, 72, 101, 102, 103, 104, 108, 119, 130, 131.

Minor in speech and hearing—15 credit hours are required, including SpHr 71, 101, 103, and at least 6 credit hours of 100-level courses to be selected from SpHr 102, 104, 108, 119, 130, and 131.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Speech and hearing therapy: See the Speech and Hearing Center.

- 11 **Voice and Diction (3)** Regnell, Richards
Development of naturalness, correctness, and clarity in conversation through the study of phonetics, rate, volume, pitch, and quality in preparation for performance. Laboratory fee, \$10. (Fall, spring, and summer)
- 71 **Foundations of Human Communication (3)** Moody, Richards
An introduction to the fundamental principles of the biology of speech, hearing and language, language structure and use, and human communicative interaction. Practice in the identification of specific verbal and nonverbal aspects of communication behavior. (Fall and spring)
- 72 **Multicultural Issues in Human Communication (3)** Stewart
Consideration of the influences of culture and bilingualism on language development and use and on communicative interaction; experimental and ethno-

graphic methods for studying language and communication in a multicultural society. (Fall)

- 101 **Hearing Science (3)** Brewer
Anatomy and physiology of the auditory mechanism; basic acoustics and psychoacoustics. Theories of hearing and frequency and intensity perception. Laboratory fee, \$20. (Fall)
- 102 **Neural Substrates of Speech, Hearing, and Language (3)** Schulz
Neuroanatomy and neurophysiology as they relate to speech, hearing, and language. Emphasis on sensory and motor systems and neuroanatomical correlates of language processing. Laboratory fee, \$20. (Fall)
- 103 **Speech Science (3)** Goldberg
Functions of the respiratory, laryngeal, and orofacial structures in normal speech production; physiological and acoustic phonetics. Laboratory fee, \$20. (Fall)
- 104 **Speech and Language Disorders (3)** Williamson
Survey of the nature and causes of developmental and acquired disorders of speech and language. Emphasis on prevention and effective communication with persons having a speech-language impairment. (Fall)
- 108 **Introduction to Audiology (3)** Brewer
Survey of the field of audiology, including the measurement of hearing, the nature and causes of hearing impairment, hearing aids and habilitation/rehabilitation of the hearing impaired. Prerequisite: SpHr 101. Laboratory fee, \$20. (Spring)
- 119 **Analysis and Modification of Communication Disorders (3)** Goldberg
Assessment of speaker-listener behavior; acoustic, behavioral, and linguistic properties of speaker intelligibility and credibility; observation, analysis, and modification of speech and language comprehension and expression. Prerequisite: SpHr 71 or 104. Laboratory fee, \$20. (Spring)
- 130 **Phonetics and Phonological Development (3)** Martinez
Detailed study of English phonetics and phonology; prespeech vocalization and phonological development; multicultural issues in phonological development; intensive practice in phonetic transcription. Laboratory fee, \$25. (Fall)
- 131 **Language Acquisition and Development (3)** Stewart
Theories of language acquisition; development of language from birth through adolescence; emphasis on development of semantics, syntax, morphology, and pragmatics; multicultural issues in language development. Laboratory fee, \$25. (Spring)
- 196 **Independent Study (1 to 6)** Staff
Independent research and special projects. Before students are permitted to register for SpHr 196, they must submit a written proposal of the plan of study and obtain approval of the staff member who will direct the study and of the department chair.

STATISTICS

Professors H.W. Lilliefors, J.L. Gastwirth, N.D. Singpurwalla, J.M. Lachin III, J.I. Verter (Research), H.M. Mahmoud, T.K. Nayak (Chair)

Associate Professors J. Rochon (Research), E.A. Thom (Research), S. Bose, R. Modarres, Z. Li

Assistant Professors N. Younes (Research), E. Bura, C. Tatsuoka, K. Ghosh, S. Kundu

Professorial Lecturers F. Ponti, P. Dasgupta, P. Chandhok

Associate Professorial Lecturer R.F. Teitel

Bachelor of Science with a major in statistics—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. Prerequisite courses—Math 31, 32, 33; Stat 91 or another first course in statistical methods.
3. Required courses in the major—Math 124; Stat 118, 119, 129, 157–58, 183, either 130 or 197, plus three approved 100-level courses, some of which, in special circumstances, may be taken in other departments. To assure a balanced program, departmental approval of electives is required for all majors.

Students who seek Special Honors in statistics should check with the Department.

Minor in statistics—18 hours of approved courses in this department, including an introductory statistics course, Stat 118 or 123, and one computer course.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Note: Stat 51, 53, 91, 104, 111, and 127 are related in their subject matter, and credit for only one of the six may be applied toward a degree. One entrance unit in algebra is prerequisite to all courses in statistics.

- 51 **Introduction to Business and Economic Statistics** (3) Nayak and Staff
Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, probability distributions, sampling, estimation, tests of hypotheses, regression and correlation, with applications to business. (Fall and spring)
- 53 **Introduction to Statistics in Social Science** (3) Tatsuoaka, Ghosh
Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation, with applications to social science. (Fall and spring)
- 91 **Principles of Statistical Methods** (3) Ghosh
Probability, frequency distributions and their characteristics, descriptive measures, estimation, tests of hypotheses, regression and correlation. Primarily for students in the natural sciences. (Fall)
- 103 **Sampling in Accounting** (3) Ponti
Special emphasis on applications of sampling techniques and design to accounting problems. Prerequisite: Stat 51, 53, 91, or equivalent. (Fall)
- 104 **Statistics in Management, Administration, and Policy Studies** (3) Staff
Lecture (3 hours), laboratory (1 hour). Introductory study of statistical techniques for research problems. For graduate students in fields other than statistics who have no previous statistics training. Offered off campus only.
- 105 **Statistics in the Behavioral Sciences** (3) Ponti
Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: an introductory statistics course and satisfactory performance on a placement examination. (Fall and spring)
- 111 **Business and Economic Statistics I** (3) Gastwirth, Bura
Descriptive statistics, graphical methods, probability, special distributions, random variables, sampling, estimation and confidence intervals, hypothesis testing, correlation and regression. (Fall)
- 112 **Business and Economic Statistics II** (3) Gastwirth, Bura
Continuation of Stat 111, with emphasis on techniques of regression, chi-square, sampling designs, index numbers, time series, decision analysis, and other topics used in economics and business. Prerequisite: Stat 111 or equivalent. (Spring)
- 118 **Regression Analysis** (3) Bura, Tatsuoaka
Lecture (3 hours), laboratory (1 hour). Simple and multiple linear regression, partial correlation, residual analysis, stepwise model building, multicollinearity and diagnostic methods, indicator variables. Prerequisite: an introductory statistics course. (Fall)
- 119 **Analysis of Variance** (3) Tatsuoaka
Lecture (3 hours), laboratory (1 hour). Introduction to the design of experiments and analysis of variance; randomized block, factorial, Latin square designs, and analysis of covariance. Prerequisite: Stat 118. (Spring)
- 123 **Introduction to Econometrics** (3) Staff
Same as Econ 123.
- 127 **Statistics for the Biological Sciences** (3) Staff
Introduction to statistical techniques and reasoning applicable to the biomedical and related sciences. Properties of basic probability functions: binomial, Poisson, and normal. Data analysis, inference, and experimental design. (Spring)
- 129 **Introduction to Computing** (3) Bura, Modarres, Teitel
Introduction to elements of computer programming and problem-solving using Pascal. Hands-on experience will be acquired through computer programming projects, including some simple statistical applications. (Fall and spring)

- 130 Computer Programming (3)** Staff
Development of advanced computing ideas: records, recursion, sets, pointer variables and dynamic storage. Introduction to data structures: stacks, queues, linked lists, and binary search trees. Prerequisite: Stat 129 or equivalent. (Spring)
- 157-58 Introduction to Mathematical Statistics (3-3)** Bose, Mahmoud
Stat 157: Basic concepts of probability theory, including random variables, independence, distribution theory, and sampling theory. Stat 158: Inference procedures, including estimation, hypothesis testing, regression analysis, and experimental design. Prerequisite: Math 32 or equivalent. (Academic year)
- 173 Discrete Systems Simulation (3)** Staff
Same as EMSE 173.
- 181 Applied Time Series Analysis (3)** Wu
Autoregressive integrated moving average (ARIMA) modeling and forecasting of univariate time series. Estimation of spectral density functions, white noise tests, and tests for periodicities. Theory and applications using SAS on the GW computer. Prerequisite: Math 33, Stat 157-58 or 118. (Fall)
- 183 Intermediate Statistical Laboratory: Statistical Computing Packages (3)** Modarres
Application of program packages (e.g., SAS, SPSS) to the solution of one-, two- and k-sample parametric and nonparametric statistical problems. Basic concepts in data preparation, modification, analysis and interpretation of results. Prerequisite: an introductory statistics course. (Fall and spring)
- 187 Introduction to Sampling (3)** Chandhok
Problems of sampling and sample design. Prerequisite: Stat 91 or equivalent. (Fall)
- 188 Nonparametric Statistical Inference (3)** Staff
Statistical inference when the form of the underlying distribution is not fully specified. Nonparametric procedures for estimation and testing hypotheses. An introduction to robust procedures. Prerequisite: Stat 91 or equivalent. (Spring, odd years)
- 189-90 Mathematical Probability and Applications (3-3)** Mahmoud
Probability theory, including combinatorial analysis, conditional probability, and stochastic independence. Random variables and their distributions: laws of large numbers and central limit theorem. Application of concepts to elementary stochastic processes such as coin-tossing sequences, branching processes, Markov chains. Prerequisite: Math 32 or equivalent. (Alternate academic years)
- 195 Reading and Research (arr.)** Staff
May be repeated once for credit. Admission by permission of department chair. (Fall and spring)
- 197 Fundamentals of SAS Programming for Data Management (3)** Modarres, Teitel
Fundamentals of the SAS system for data management, statistical analysis, and report writing. Data modification; programming; file handling; and macro writing. Prerequisite: An introductory statistics course and Stat 129. (Fall)
- 198 Special Topics (3)** Staff
Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the content differs.

STRATEGIC MANAGEMENT AND PUBLIC POLICY

Professors H.J. Davis, W.H. Becker, D.J. Lenn

Associate Professors J.B. Thurman (Chair), J. Cook, E.J. Englander, J.H. Beales III, M. Starik, L. Burke

Assistant Professors D.R. Kane, R.A. Carruth, J. Griffin, A. Prakash, B.S. Teng, J.W. Geranios

Professorial Lecturer W.N. LaForge

See the School of Business and Public Management for programs of study leading to the degree of Bachelor of Business Administration.

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| 51 Introduction to Business (3) | Staff |
| Structure, activities, and problems of business enterprise; its contribution to the individual and society; careers in business. Prerequisite: Sophomore standing. (Fall) | |
| 104 Business Law: Regulatory Environment of Business (3) | Staff |
| Same as Accy 153. | |
| 105 Business Law: Contract, Torts, and Property (3) | Staff |
| Same as Accy 151. | |
| 106 Business Law: Enterprise Organization (3) | Staff |
| Same as Accy 152. | |
| 190 Special Topics (3) | Staff |
| Experimental offering; new course topics and teaching methods. | |
| 199 Independent Study (arr.) | Staff |
| Assigned topics. Admission by prior permission of advisor. May be repeated once for credit. (Fall and spring) | |

TEACHER PREPARATION AND SPECIAL EDUCATION

Programs in teacher preparation and special education are offered at the graduate level by the Graduate School of Education and Human Development. The following courses are available to undergraduates.

SPECIAL EDUCATION

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|---|-------|
| 187 Sign Language and Deafness I (3) | Staff |
| Introduction to American Sign Language and to cultural aspects of the deaf community. | |
| 188 Sign Language and Deafness II (3) | Staff |
| Development of conversational skills in American Sign Language and of cultural awareness of the deaf community. Prerequisite: SpEd 187. | |

THEATRE AND DANCE

Professors M.R. Withers, A.G. Wade, L.B. Jacobson (*Chair*), N.C. Garner
Associate Professors W.A. Pucilowsky, C.F. Gudenius
Assistant Professors B.W. Sabelli, M.A. Buckley

Bachelor of Arts with a major in theatre—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Required courses in related areas—9 credit hours in dramatic literature and play-writing at the 100 level.
3. Required courses in the major—TrDa 14, 124, 130, 139 (3 credits), 145–46, 147; 6 credit hours in design/technical theatre courses; 12 additional credit hours in 100-level theatre and dance courses.

Bachelor of Arts with a major in dance—The following requirements must be fulfilled:

1. The general requirements stated under *Columbian College of Arts and Sciences*.
2. Required courses in the major: 13 credit hours of courses in technique; 17 hours of courses in creative process/performance; 3 hours of production design; 6 hours of electives. The department maintains a list of courses that fulfill these requirements.

Bachelor of Arts with a major in dramatic literature—The Department of Theatre and Dance and the Department of English offer an interdisciplinary major in dramatic literature. See *Dramatic Literature*.

Minor in Theatre—18 credit hours of theatre courses, including TrDa 145–46.

Minor in Dance—18 credit hours of dance courses, including no more than 9 hours from TrDa 49 through 59 and 160 through 175, plus 3 hours from TrDa 180, 182–83, 185, 186, and 191.

Special Honors—In addition to meeting the general requirements stated under University Regulations, candidates for graduation with Special Honors in Theatre or Dance must have a grade-point average of 3.4 in the major and complete TrDa 199 with a grade of A. They must consult with a faculty advisor at the beginning of the first semester of the senior year to determine eligibility, area of study, and the director of the research or creative project.

With permission, a limited number of graduate courses in the department may be taken for credit toward an undergraduate degree. See the Graduate Programs Bulletin for course listings.

Note: Courses below the 100 level are primarily for nonmajors.

- 11 Theatre Production (3)** Sabelli
Understanding of the basic elements of production (performance, technical and management) and the collaborative artist/artisan process through discussion, observation, and practical application. (Fall and spring)
- 14 Introduction to Acting (3)** Garner, Jacobson, Wade
Basic techniques of concentration, imagination, improvisation, and character development. (Fall and spring)
- 45 Understanding the Theatre (3)** Sabelli
The art of the theatre; its literature, architecture, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer. Attendance at theatrical performances, presentations, and videos. (Fall and spring)
- 46 Understanding the Dance (3)** Staff
The knowing, doing, and making of the art of dance through creative processes, dance styles, history, and visual representations. (Fall and spring)
- 49 Introduction to Dance and Movement Awareness (2)** Staff
Human movement and its connection to dance. Fundamental movement concepts that underlie all movement styles. Basic principles of awareness and organization into movement patterns. May be repeated for credit. (Fall and spring)
- 50 Beginning Ballet (1)** Staff
- 51 Beginning/Intermediate Ballet (1)** Staff
- 52 Beginning Modern Dance (1)** Staff
- 53 Beginning/Intermediate Modern Dance (1)** Staff
- 58 Beginning Spanish Dance (1)** Staff
- 59 Beginning/Intermediate Spanish Dance (1)** Staff
- 105 Fundamentals of Playwriting (3)** Griffith
Same as Engl 105.
- 108 Intermediate Playwriting (3)** Griffith
Same as Engl 108.
- 115 Introduction to Scene Study: Realism (3)** Garner, Jacobson
Principles of role development, concentrating on 20th-century material. Prerequisite: TrDa 14. (Fall and spring)
- 116 Scene Study: Voice and Character (3)** Jacobson
The practice and application of voice production with reference to skeletal alignment, breathing, resonance, and articulation. Emphasis on the process of voice production and its application to performance through work on scenes and monologues. Prerequisite: TrDa 115. (Fall and spring)
- 120 Scene Study: Postrealism (3)** Wade
The actor's approach to the presentational aesthetics in the work of modern and contemporary dramatists. Prerequisite: TrDa 116. (Spring, even years)
- 121 Scene Study: Contemporary Comedy (3)** Garner, Jacobson
Principles of role development, comic timing, and stage business, concentrating on material by contemporary playwrights, such as Neil Simon. Prerequisite: TrDa 116. (Fall, odd years)
- 122 Scene Study: Shakespeare (3)** Wade
Principles of role development and handling of verse dialogue in Shakespearean drama. Prerequisite: TrDa 116. (Fall, odd years)
- 123 Scene Study: Classical Comedy (3)** Jacobson, Garner
Principles of role development, concentrating on material from the English Restoration, Molière, and other 17th- and 18th-century playwrights. Prerequisite: TrDa 116. (Spring, even years)
- 124 Play Analysis (3)** Wolf
Same as Engl 124.
- 125 Stage Dialectics (3)** Jacobson
Vocal production related to interpretation of specific texts. Focus on stage dialects and the interpretation of Shakespeare. Prerequisite: TrDa 116. (Spring, odd years)

- 127 **Scene Study: Film and Television** (3) Wade
Techniques of acting for the camera; analysis of film and television scripts from actor's point of view. Prerequisite: TrDa 116. Laboratory required. Laboratory fee, \$10. (Spring)
- 128 **Audition Techniques** (3) Garner
All aspects of the audition process: selection and rehearsal of audition monologues, handling of cold reading, etc. Prerequisite: TrDa 116. (Fall)
- 130 **Basics of Production Design** (3) Sabelli, Pucilowsky, Gudenius
Understanding of the basic elements of production design and execution through discussion, observation, and practical application. Laboratory required. Laboratory fee, \$50. (Fall and spring)
- 131 **Introduction to Lighting** (3) Gudenius
Lecture (2 hours), laboratory (1 hour). Theories and practicum in lighting for theatre and dance. Laboratory fee, \$15. Prerequisite: TrDa 130. (Fall)
- 132 **Makeup Design** (3) Pucilowsky
Theory and practicum in the art of makeup design, including latex and crepe hair. Prerequisite: TrDa 130. (Fall)
- 135 **Introduction to Scene Design** (3) Sabelli
Fundamental study of scenography, including historic overview, basic drawing, and rendering techniques, through the use of various mediums and script analysis. Prerequisite: TrDa 130. (Fall, odd years)
- 136 **Beginning Costuming** (3) Pucilowsky
History of fashion in Western civilization from ancient Greece to the 20th century. Fundamental study of costume research through specific projects. Costume construction. Prerequisite: TrDa 130. (Spring)
- 139 **Theatre Practicum** (1) Gudenius
Participation in department mainstage productions in a production or management capacity under the supervision of a member of the faculty. Prerequisite: TrDa 11 or 130. May be repeated for credit. After completing for 3 credits, students may participate in a performance capacity for an additional 3 credits. Prerequisite: TrDa 11 or 130. (Fall and spring)
- 140 **Anthropology in Performance** (3) Garner, Allen
Exploration of the relationships among social interaction, ritual, and dramatic performance. Classes consist of improvisation workshops and discussion, based on readings about non-Western cultures. Same as Anth 191. (Spring)
- 145-46 **History of the Theatre** (3-3) Wolf
A dramaturg's approach to case studies of theatre in historical context. TrDa 145: Ancient Greece through the 17th century. TrDa 146: the 18th, 19th, and 20th centuries. (Academic year)
- 147 **Directing for the Theatre** (3) Garner
Fundamentals of script analysis, casting, and rehearsal techniques. Prerequisite: TrDa 14, 124, 130. Laboratory fee, \$15. (Fall and spring)
- 156 **Dance in Community Settings** (3) Staff
The examination of dance as it is translated into the community as therapy, as education, as art. The course includes participation in a community institution or with a community group with a dance community specialist.
- 160-61 **Intermediate Ballet** (2-2) Staff
May be repeated for credit. Prerequisite: TrDa 51 or equivalent.
- 162-63 **Intermediate/Advanced Ballet** (2-2) Staff
May be repeated for credit. Prerequisite: TrDa 160 or 161 or equivalent.
- 164-65 **Advanced Ballet** (2-2) Staff
May be repeated for credit. Prerequisite: TrDa 162 or 163 or equivalent.
- 170-71 **Intermediate Modern Dance** (2-2) Staff
May be repeated for credit. Prerequisite or corequisite: TrDa 49 or equivalent.
- 172-73 **Intermediate/Advanced Modern Dance** (2-2) Staff
May be repeated for credit. Prerequisite: TrDa 170 or 171 or equivalent.
- 174-75 **Advanced Modern Dance** (2-2) Staff
May be repeated for credit. Prerequisite: TrDa 172 or 173 or equivalent.
- 180 **Movement Improvisation and Performance** (3) Withers
Exploring the body and its surroundings in movement, use of language, narrative, environments and contexts for creative expression, developing event and performance structures from improvisation.

- 182-83 **Dance Composition** (3-3) Withers
TrDa 182: Problems in structural and conceptual aspects of making dances, including scripting and scoring for performance. TrDa 183: Emphasis on intention and content in making dances. TrDa 180 recommended. (Academic year)
- 184 **Choreographic Projects** (3) Withers
Create a dance or a performance work of individual design, including casting, rehearsal procedures, staging aspects, and public presentation. Prerequisite: TrDa 131, 180, 182, 192. May be repeated for credit.
- 185 **Trends in Performance Art** (3) Staff
Study of the theory and practice of contemporary performance art movements and artists; scripting and scoring to create performance works based on a single art discipline or interdisciplinary arts, including movement, text, voice, visual elements, music, and multimedia.
- 186 **Movement Analysis** (3) Withers
Deepen understanding of the moving body as the instrument for performance with emphasis on process and awareness; includes kinesiology, dynamic alignment, efficiency, integration of body and mind, release techniques, initiative, and weight in motion. Prerequisite: TrDa 49.
- 191 **Dance History** (3) Staff
The history of dance as a cultural and artistic entity.
- 192 **Repertory/Performance** (1 or 2) Withers
Participation in the processes of learning dance repertory and performing dance works. Audition required. Laboratory required. May be repeated for credit.
- 193-94 **Dance Styles** (arr.) Staff
Forms of theatrical dance other than ballet or modern. (Academic year)
- 195 **Selected Topics** (1 to 3) Staff
Topics of current interest in theatre or dance. Topics announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 196 **Independent Study** (1 to 6) Staff
Independent research and special projects. Open to seniors or exceptionally well-prepared juniors majoring in theatre or dance. Before students are permitted to register for TrDa 196, they must submit a written proposal of the plan of study and obtain approval of the faculty member who is directing the study and the department chair.
- 198 **Internship** (3 or 6) Staff
Open to seniors majoring in theatre or dance. Work placements with not-for-profit and commercial theatre and dance organizations for an approved number of hours per week. Admission requires departmental approval. May be taken for a maximum of 6 hours. (Fall and spring)
- 199 **Honors Thesis** (3) Staff
Directed research and/or creative project. Open to qualified seniors by permission. Arrangements must be made with a sponsoring faculty member in the department and applications must be completed early in the second semester of the junior year. (Fall and spring)

TOURISM AND HOSPITALITY MANAGEMENT

Professor D.E. Hawkins

Associate Professors D. Frechtling (Chair), L. Yu, L.A. Delpy Neirotti, S.E. Spivack,

M.V. Smith

Assistant Professor M.W. Lonam

Assistant Professorial Lecturer E. Zavian

See the School of Business and Public Management for programs of study leading to the degree of Bachelor of Business Administration and the five-year, dual-degree program leading to the Bachelor of Business Administration and Master of Tourism Administration.

- 104 **Introduction to Tourism and Hospitality Management** (3) Spivack
Historical overview and survey of the tourism and hospitality industry, with emphasis on the travel market, delivery of hospitality services, professional roles, and emerging trends. (Fall and spring)
- 113-14 **Practicum** (3-3) Staff
Fieldwork, internship, and/or instructional practice, including conference and/or seminar. Admission by permission of instructor. May be repeated once for credit with permission of advisor. (Fall, spring, and summer)

- 135 **Sport and Recreation Business Enterprises (3)** Delpy Neirotti
An overview of business opportunities related to sport and recreation. Emphasis on sport and recreation facilities and events; product manufacturing, merchandising, and licensing; media and publications; memorabilia; and athlete representation. (Fall)
- 136 **Sport and Recreation Marketing (3)** Delpy Neirotti
Application of marketing theories and practices to sport and recreation events and properties. Sponsorship, endorsement proposals, promotional campaigns. Prerequisite: BAdm 110. (Spring)
- 137 **Issues in Sport and Recreation Management (3)** Delpy Neirotti
Trends, opinion leaders, political realities, policies, procedures, and other sport administration issues from grass roots to professional sports. (Spring)
- 143 **Hospitality Industry Management (3)** Yu
An overview of the basic principles and practices involved in the management, operation, marketing, and financing of hotels, restaurants, and other hospitality goods and services. (Spring)
- 144 **Financial Management in the Tourism and Hospitality Industry (3)** Yu
Basic principles of planning and managing tourism resources, developments, and facilities in relation to investment constraints and opportunities. Financial monitoring and control of hospitality facilities and related leisure services. (Spring)
- 145 **Travel Marketing Communications (3)** Spivack
Review of basic advertising, public relations, and sales techniques, applied to the tourism and hospitality industry. Current practices and case studies. (Fall)
- 147 **Passenger Transportation Systems (3)** Staff
Survey of passenger transportation modes. Emphasis on airline operations, marketing communications, and distribution channels. (Fall)
- 172 **International Experiences (1 to 6)** Delpy Neirotti
Travel to a foreign country for study of a specific topic. May be repeated for credit with permission of the advisor. (Fall, spring, and summer)
- 190 **Special Topics (1 to 3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall, spring, and summer)
- 199 **Independent Study (1 to 3)** Staff
Assigned topics. Admission by prior permission of advisor. May be repeated once for credit. (Fall, spring, and summer)

UNIVERSITY PROFESSORS

University Professors A. Etzioni, P.J. Caws, S.H. Nasr, K.F. Schaffner, J.N. Rosenau

Courses numbered in the 770s and 780s are taught by distinguished scholars who hold appointments as University Professors. With the approval of the department or program concerned, appropriate University Professor courses may be taken to satisfy degree program requirements. Permission of the University Professor may be required for enrollment. A complete listing of courses offered each semester appears in the *Schedule of Classes* under the 700 series. Following is a list of courses that are expected to be taught fairly regularly by University Professors.

IAff/PSc

- 770 **Turbulence in World Politics (3)** Rosenau
An effort to probe the sources and dynamics of change and continuity in local, national, and international affairs. The links between the orientations of individuals and the actions of collectivities are a major focus, along with the foundations of authority under transformative conditions. For graduate students; open to upper-level undergraduates.

IAff/PSc

- 771 **Political Aggregation (3)** Rosenau
An exploration of how collective action is fashioned out of the input of individuals, how collectivities become larger than the sum of their parts, and how political organizations manage to persist through time. Socialization, mobilization, momentum, and bandwagon effects are among the concepts evaluated. For graduate students; open to upper-level undergraduates.

IAff/PSc

772 **The Dynamics of Globalization (3)**

Rosenau

An inquiry into the economic, cultural, and political processes through which individual and community life is expanding as awareness encompasses factors on a global scale. The consequences of this expansion at both global and local levels is examined, along with the possibility that these levels interact. For graduate students; open to upper-level undergraduates.

IAff/PSc

773 **Global Governance (3)**

Rosenau

An inquiry into the prospects for and problems of governance on a global scale in the era following the end of the Cold War. Informal forms of governance as well as those that have undergone institutionalization are assessed. For graduate students; open to upper-level undergraduates.

HmSc

771 **The Cinema of Morals/The Morals of Cinema (3)**

Caws

Vicarious moral experience in the cinema; examples of such experience in film and the moral arguments they provoke; the power of cinema as a shaper of moral sentiment; moral issues in the production and distribution of films. For graduate students; open to undergraduates.

Phil

772 **Individualism (3)**

Caws

The concept of the free individual in philosophy, psychology, literature, and politics; individuals and groups; individualism and collectivism; exemplary individuals in biography, autobiography, and fiction; problems of individual and collective agency and identity. For undergraduates; open to graduate students.

Phil

774 **Understanding Technology (3)**

Caws

The idea of technology—its relation to the sciences and the arts and humanities, its development, and its problems. Technology will not be regarded as merely dependent on the sciences or as merely useful (or dangerous) but as a human activity in its own right, with its own history, conceptual structure, interests, risks, and benefits. For undergraduates; open to graduate students.

Phil

778 **Left and Right in Philosophy and Politics (3)**

Caws

A fundamental inquiry into the concept of the state in terms of entrenched oppositions: individualism/collectivism, equality/liberty, liberalism/conservatism, socialism/free enterprise, communism/capitalism. Emphasis on the present need to find a constructive transcendence of these oppositions. For graduate students; open to undergraduates.

Phil

779 **Philosophy and Psychoanalysis (3)**

Caws

An exploration of some striking parallels between the topics addressed by Freud's psychoanalytic theories on the one hand and the traditional content of philosophical reflection on the other, with special emphasis on the relation between cognitive theory and therapeutic practice (in both disciplines). For graduate students; open to undergraduates.

HCS/Phil

770 **Philosophy of Medicine (3)**

Schaffner

An introduction to philosophical issues in medicine, including scientific progress, the doctor-patient relationship, whether diseases are objective or socially conditioned entities, clinical reasoning using some simple examples from medical diagnosis and new drug testing, and ethical and social issues raised by the AIDS epidemic. For undergraduates; open to graduate students.

Phil

771 **Philosophy of Biology (3)**

Schaffner

An introduction to philosophical issues in biology, including evolutionary biology, molecular biology and reductionism, teleology, experimental objectivity, philosophical implications of the neurosciences, sociobiology, and evolutionary ethics. For undergraduates; open to graduate students.

HCS/Phil

775 **Ethics and Health Policy (3)**

Schaffner

The problem of health care reform and ethical issues associated with managed care and competition, Medicare and Medicaid reform, and the issue of health care rationing. Issues relating to the "right to die," including active and passive euthanasia and physician-assisted suicide. For graduate students; open to undergraduates.

HCS/Phil

777 **The Human Genome Project:**

Schaffner

Ethical, Legal, and Social Implications (3)

Ethical, legal, and social implications of the decoding of the entire human genome, including confidentiality of genetic information, genetic discrimination and insurance, reductionistic/deterministic implications, forensic issues, research ethics, gene therapy and patenting, and cloning. For graduate and medical students; open to undergraduates.

HCS/Phil

780 **Neurobiology and Reductionism (3)**

Schaffner

Recent developments in neuroscience and theories of consciousness, including neural networks; philosophical implications, including the relations among genetics, brains, and behavior. For graduate students; open to qualified undergraduates.

Rel

770 **Islamic Civilization and the West (3)**

Nasr

The encounter of Islam and the West, from the rise of Islam to modern times. Investigation of the impact of Islam on European philosophy, science, art, and literature; influence of the West and Western scholarship on the Islamic world. For juniors and seniors; open to graduate students.

Rel

771 **Persian Sufi Literature in East and West (3)**

Nasr

The writings of major Persian Sufi poets and writers, such as Khayyam, Attar, Rumi, Shabistari, and Hafiz, and their impact on the West and on India. The translation of these works into European languages and their influence upon such figures as Goethe and Emerson are discussed. Assigned readings in English. For undergraduates; open to graduate students.

Rel

772 **Mysticism—East and West (3)**

Nasr

A thematic examination of mystical traditions: the nature of mysticism, the search for ultimate reality, the mystical significance of the cosmos, the mystical science of the soul, and the significance of sacred art and symbols. Major mystical traditions of East and West—Hinduism, Taoism, Buddhism, Judaism, Christianity, Islam. For undergraduates; open to graduate students.

Rel

773 **Perennial Philosophy (3)**

Nasr

The idea of perennial philosophy as developed in the 20th century by A. Huxley, A.C. Coomaraswamy, and others. Doctrines and teachings of perennial philosophy as found in various religious and philosophical traditions of East and West. Prerequisite: at least one course in religion, philosophy, or intellectual history. For undergraduates; open to graduate students.

Rel

775 **Man and the Natural Environment (3)**

Nasr

The religious, philosophical, and scientific causes of the present environmental crisis. The history of religious and philosophical attitudes toward nature in the West, in the history of Western science, and in some non-Western world views that may encourage a more harmonious relationship between man and the natural environment. For undergraduates; open to graduate students.

Rel

777 **Religion and Science (3)**

Nasr

The interaction between religion and science in ancient Egypt, classical Greece, Islam, India, China, and the West, from the Renaissance, the scientific revolu-

tion, and up to the present day. Key concepts and issues in the encounter of religion and science in light of the cultural matrix of the civilization and period in question. For juniors and seniors; open to graduate students.

Soc

776 Public Policy Research (3)

Etzioni

Basic concepts of policy research in comparison to basic and applied research. Policy research methods. The social structure of policy research: producers and consumers of knowledge and issues arising among them. Open to undergraduates and graduate students with permission of the instructor. Prerequisite: social science or public policy course work or related experience.

PSc/Soc

777 Contemporary American Society (3)

Etzioni

A social science perspective of contemporary American society. Analysis of concepts that allow continued insight into America's condition and future. Institutions examined include the family, schools, communities, the polity, and relations among racial/ethnic groups. For graduate students; open to undergraduates.

Soc/Econ/PSc

779 The Elements of Socioeconomics (3)

Etzioni

A synthesized approach to the study of economic behavior and economic policy, drawing on relevant segments of economics and sociology as well as political science and psychology. A discussion of ethical assumptions and core concepts in the study of micro- and macroeconomic behavior and their policy implications. For graduate students; open to qualified undergraduates.

Soc/PSc/IAff

781 Elements of Communitarian Thinking (3)

Etzioni

An examination of the roots of communitarian thinking in earlier philosophical work, current political theory, and historical and contemporary sociology. The relevance of communitarian thinking to various community-building social movements. For graduate students; open to undergraduates with permission of instructor.

Soc/PSc/IAff

782 Elements of Public Policy in Communitarian Perspective (3)

Etzioni

The issues that arise when communities seeking to advance their goals run into commitments to individual and minority rights. Freedom of speech and hate codes, public safety and protection against search and seizure, majority votes and minority rights, and other policy issues. For graduate students; open to undergraduates with permission of instructor.

VIETNAMESE

See East Asian Languages and Literatures.

WOMEN AND LEADERSHIP PROGRAMS

Director N. Mikhalevsky

The courses listed below are restricted to students who participate in the Elizabeth J. Somers Women's Leadership Programs on the Mount Vernon Campus.

101-2 Women and Leadership (3-3)

Women's status and leadership roles examined from various perspectives and various fields of endeavor, such as science and technology, the arts, international leadership, and U.S. politics and policy. Prerequisite to WLP 102: WLP 101 or permission of the instructor. Concurrent registration in WLP 110-11 is required.

110-11 Women and Leadership I Symposium (0 or 1 each)

A series of special programs that complements WLP 101-2. Concurrent registration in WLP 101-2 is required.

120-21 Women and Leadership II Symposium (0 or 1 each)

A series of special programs and experiential learning. Concurrent registration in WLP 151 is required for WLP 120.

151 Theory and Practice of Women's Leadership (3)

Contemporary theories of leadership; factors affecting women as leaders; building leadership skills through experiential learning. Prerequisite: WLP 102 or

permission of instructor. Concurrent registration in WLP 120 is required. Same as Psyc 151.

WOMEN'S STUDIES

Professors D. Bell (*Director*), H. Hartmann (*Research*), P.M. Palmer
Associate Professors C.E. Harrison, C. Deitch
Assistant Professors R. Chhibber, A. Zucker
Adjunct Assistant Professors M. Frost, B. Morris
Lecturer N. Turner

Committee on Women's Studies

D. Bell, N. Cahn, C. Deitch, C. Gamber, C.E. Harrison, H. Hartmann, L. Jacobson, N. Mikhalevsky, D. Moshenberg, P.M. Palmer, A. Romines, G. Weiss, A. Zucker

Bachelor of Arts with a major in women's studies—The following requirements must be fulfilled:

1. The general requirements stated under Columbian College of Arts and Sciences.
2. **Prerequisite course**—WStu 1.
3. **Required**—30 credit hours consisting of (a) WStu 120, 125, 199; (b) one 3-credit course chosen from WStu 170, 183, 195; and (c) six courses from the three groups that follow, with a minimum of one course chosen from each group. *Diversity/cross-cultural studies*: AmSt/Hist/WStu 185, Anth/WStu 121, Chin/WStu 136, Engl 174, Phil 125, and Span 140. *Humanities*: Any of the preceding courses plus AmSt/Hist/WStu 139–40, Clas 170, Engl 162 or 175, Hist 125. *Social science*: Anth 150, 154, 157; Psyc 150; Soc 166, 175. With approval of the program advisor, courses with appropriate subject matter may be substituted for those specified above.

Special Honors—For Special Honors in women's studies, a major must meet the general requirements stated under University Regulations, attain a grade-point average of at least 3.7 in courses counted for the women's studies major and 3.3 overall, receive a grade of A in WStu 199, and submit an honors paper to the Women's Studies Program. Upon faculty review of honors paper, the student may be recommended for graduation with Special Honors.

Minor in women's studies—Undergraduates who select a minor in women's studies must declare their intention to the director no later than the beginning of their senior year. Students are required to complete at least 18 credit hours for the minor, including two required courses (WStu 120 and 125) and four elective courses (of which at least three are at the 100 level), as approved by the advisor. In addition to the 100-level courses listed below, elective courses that are typically approved for the minor include Clas 170; Engl 162, 174, 175; Hist 125; Phil 125; Psyc 150; Soc 166, 175; Span 140. Pertinent courses are frequently taught as departmental topics courses and in the 700 Series.

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|-----|--|------------------|
| 1 | Women in Western Civilization (3)
Exploration of critical periods of intellectual and cultural change in Western societies as influenced by and affecting women. Examination of images of women and of changing ideal types of femininity and masculinity. Aspects of law, religion, art, culture, work, and politics in relation to these topics. Same as Hist 42. (Fall) | Morris and Staff |
| 120 | Introduction to Women's Studies (3)
A multidisciplinary examination of historical conditions, cultural norms, and social institutions that define women's status in Western culture. Experiences of girls and women in various racial-ethnic, class, and age groups. Alternative visions for women's (and, by implication, men's) roles and status. Sophomore standing required. (Fall and spring) | Gamber and Staff |
| 121 | The Anthropology of Gender: Cross-Cultural Perspectives (3)
Anthropological representations of gender relations in "other" cultures have provided important case material for feminist theorizing of sex differences and gender roles and statuses. How a cross-cultural approach can inform our understanding of gender. Same as Anth 121. (Spring) | Bell |
| 125 | Varieties of Feminist Theory (3)
Classical and contemporary texts on feminist explanations of women's status. Relationships within the sex-gender system and arrangements based on class and race. Evaluation, through the lens of feminist theory, of several academic | Deitch |

disciplines in the sciences, social sciences, and humanities. Prerequisite: WStu 1 or 120 or permission of instructor. (Spring)

- 136 **Chinese Women in Myth, Literature, and Film** (3) Frost
Same as Chin 136.

- 139-40 **Women in the United States** (3-3) Murphy, Harrison
Same as Hist/AmSt 139-40.

- 170 **Selected Topics** (3) Staff
Examination and analysis of central issues in women's studies, such as women and difference, women in media, women and violence, athletics and gender. Topic changes each semester; may be repeated for credit. (Fall and spring)

- 181 **Women in Western Religion** (3) Staff
Same as Rel 181.

- 183 **Practicum in Women's Studies** (3) Deitch
Study of the changing status of women through supervised assignment to public and private agencies engaged in policymaking, education, political action, and research. Usually for seniors. Placement arrangements must be made the semester prior to registration; departmental permission is required. (Spring)

- 185 **Black Women in U.S. History** (3) Alexander
Same as AmSt/Hist 185.

- 195 **Undergraduate Research** (1 to 3) Staff
A written proposal approved by the member of the faculty who will supervise the research is required prior to registration.

- 199 **Senior Seminar** (3) Bell and Staff
For students completing a major or minor in women's studies. Writings of contemporary scholars and writers whose work provides critical frameworks for feminist scholarship and research. Individual or collaborative research projects are presented and submitted as written papers. (Fall)

YIDDISH

See Classical and Semitic Languages and Literatures.

Faculty

FACULTY AND STAFF OF INSTRUCTION 2001-2002
(as of Fall 2001)

Columbian College of Arts and Sciences

School of Business and Public Management

Graduate School of Education and Human Development

School of Engineering and Applied Science

Elliott School of International Affairs

EMERITI

Lewis Francis Affronti, *Professor Emeritus of Microbiology and Immunology*

B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke University

Frederick Amling, *Professor Emeritus of Business Finance*

B.A. 1948, Baldwin-Wallace College; M.B.A. 1949, Miami University; Ph.D. 1957, University of Pennsylvania

Galip Mehmet Arkilic, *Professor Emeritus of Engineering and Applied Science*

B.S. in M.E. 1946, Cornell University; M.S. 1947, Illinois Institute of Technology; Ph.D. 1954, Northwestern University

David Lynn Atkins, *Professor Emeritus of Biology*

B.A. 1957, University of Texas; M.A. 1963, East Texas State University; Ph.D. 1970, Texas A&M University

Robert Edward Baker, *Professor Emeritus of Education*

B.S. in Ed. 1939, State University of New York at Buffalo; M.A. 1954, Catholic University of America; M.A. in Ed. 1956, Ed.D. 1962, George Washington University

Ruth Lillian Aaronson Bari, *Professor Emeritus of Mathematics*

B.A. 1939, City University of New York, Brooklyn College; M.A. 1943, Ph.D. 1966, Johns Hopkins University

Shirley Russell Barnett, *Associate Professor Emeritus of Spanish*

B.A. 1944, Vassar College; M.A. 1946, Vanderbilt University; Ph.D. 1958, University of Minnesota

Otto Bergmann, *Professor Emeritus of Physics*

Ph.D. 1949, University of Vienna

Nancy Joan Belknap, *Professor Emeritus of Special Education*

B.S. 1966, University of Michigan; M.A. in Ed. 1970, George Washington University; Ed.D. 1978, American University

Lee Sheward Bielski, *Professor Emeritus of Speech Communication*

B.S. 1940, Ohio University; M.A. 1944, University of Michigan

Giorgio Vittorio Borgiotti, *Professor Emeritus of Engineering and Applied Science*

Eng.Dr. 1957, University of Rome

John Gordon Boswell, *Professor Emeritus of Education*

B.A. in Ed. 1953, M.A. in Ed. 1956, Ed.D. 1963, George Washington University

Lloyd Spencer Bowling, *Professor Emeritus of Speech and Hearing*

B.A. 1954, M.A. 1957, Ed.D. 1964, University of Maryland

Marcella Brenner, *Professor Emeritus of Education*

B.S. in Ed. 1934, Johns Hopkins University; M.A. 1949, American University; Ed.D. 1962, George Washington University

David Springer Brown, *Professor Emeritus of Management*

B.A. 1936, University of Maine at Orono; Ph.D. 1955, Syracuse University

Frederick James Brown, Jr., *Professor Emeritus of Education*

B.A. 1947, M.Ed. 1951, Western Maryland College; Ed.D. 1962, Columbia University

Robert Guy Brown, *Professor Emeritus of Sociology*

B.A. 1949, University of Rhode Island; M.A. 1951, Ph.D. 1960, University of North Carolina

James Franklin Burks, *Professor Emeritus of French*

B.A. 1951, M.A. 1952, University of Cincinnati; Ph.D. 1957, Indiana University

Elizabeth Burtner, *Professor Emeritus of Physical Education*

B.A. 1927, Hood College; M.A. 1935, Columbia University

Willard Edmund Caldwell, *Professor Emeritus of Psychology*

B.A. 1940, M.A. 1941, University of Florida; Ph.D. 1946, Cornell University

Ali Bulent Cambel, *Professor Emeritus of Engineering and Applied Science*

B.S. 1942, Robert College, Turkey; M.S. 1946, California Institute of Technology; Ph.D. 1950, University of Iowa

Bayard Lacey Catron, *Professor Emeritus of Public Administration*

B.A. 1963, Grinnell College; M.A. 1965, University of Chicago; M.C.P. 1972, Ph.D. 1975, University of California, Berkeley

Mary Ann Bieter Coffland, *Associate Professor Emeritus of Romance Languages*

B.A. 1952, College of St. Catherine; M.A. 1957, Ph.D. 1965, University of Minnesota

Victor Hugo Cohn, *Professor Emeritus of Pharmacology*

B.S. 1952, Lehigh University; M.A. 1954, Harvard University; Ph.D. 1961, George Washington University

Mary Ellen Coleman, *Professor Emeritus of Education*

B.S. 1937, Madison College; M.A. in Ed. 1950, George Washington University

Thomas Francis Courtless, Jr., *Professor Emeritus of Sociology*

B.A. 1955, Pennsylvania State University; M.A. 1960, Ph.D. 1966, University of Maryland

Linda Grant DePauw, *Professor Emeritus of American History*

B.A. 1961, Swarthmore College; Ph.D. 1964, Johns Hopkins University

James Fearing Dinwiddie, *Professor Emeritus of Engineering Management*

B.S. 1948, Carnegie Institute of Technology; M.S. 1956, North Carolina State University; M.S. 1966, Ph.D. 1972, Stanford University

Miriam Violet Wein Dow, *Assistant Professor Emeritus of English*

B.A. 1959, University of Akron; M.A. 1960, University of Michigan; Ph.D. 1977, University of Maryland

Roy Brandon Eastin, *Professor Emeritus of Business Administration*

B.A. 1943, M.A. 1945, George Washington University; Ph.D. 1953, American University

John Eftis, *Professor Emeritus of Engineering and Applied Science*

B.C.E. 1952, City University of New York, City College; M.S. in C.E. 1958, Columbia University; D.Sc. 1967, George Washington University

Marvin F. Eisenberg, *Professor Emeritus of Engineering and Applied Science*

B.S. in E.E. 1953, University of Miami; M.S. in Engr. 1954, Ph.D. 1961, University of Florida; P.E.

Julian Eisenstein, *Professor Emeritus of Physics*

B.S. 1941, M.A. 1942, Ph.D. 1948, Harvard University

Rodney Walter Eldridge, *Professor Emeritus of International Finance*

B.A. 1949, M.A. 1959, University of Vermont; Ph.D. 1966, Columbia University

Charles Fox Elliott, *Associate Professor Emeritus of Political Science and International Affairs*

B.A. 1953, Ph.D. 1964, Harvard University; M.A. 1958, University of California, Berkeley

Lloyd Hartman Elliott, *Professor Emeritus of Higher Education; President Emeritus of the University*

B.A. 1937, Glenville State College; M.A. 1939, LL.D. 1967, West Virginia University; Ed.D. 1948, University of Colorado; LL.D. 1963, University of New Hampshire; LL.D. 1965, Colby College; LL.D. 1966, Concord College; LL.D. 1969, University of Maine at Orono; LL.D. 1970, Husson College; LL.D. 1971, Georgetown University; Litt.D. 1986, West Virginia Institute of Technology; D.H.C. 1986, Kansai University, Japan; LL.D. 1988, American University

Donald Michael Esterling, *Professor Emeritus of Engineering*

B.S. 1964, University of Notre Dame; M.A. 1966, Ph.D. 1968, Brandeis University

James Elmer Feir, *Professor Emeritus of Civil Engineering*

B.S. 1950, University of Alberta, Canada; M.S. 1955, University of London; Ph.D. 1966, Cambridge University

Anthony Vincent Fiocco, *Professor Emeritus of Operations Research and Applied Science*

B.A. 1950, Union College, New York; Ph.D. 1967, Northwestern University

Nicolae Filipescu, *Professor Emeritus of Chemistry*

Ph.D. 1957, University of Industrial Chemistry, Polytechnical Institute, Romania; Ph.D. 1964, M.D. 1975, George Washington University

Roderick Stuart French, *Professor Emeritus of Philosophy; Vice President Emeritus for Academic Affairs*

B.A. 1954, Kenyon College; M.Div. 1957, Episcopal Divinity School; S.T.M. 1965, Union Theological Seminary; Ph.D. 1971, George Washington University

Arthur Daniel Friedman, *Professor Emeritus of Engineering and Applied Science*

B.A. 1961, B.S. in E.E. 1962, M.S. in E.E. 1963, Ph.D. 1965, Columbia University

- Michael Graham Gallagher, *Professor Emeritus of Accountancy***
B.A. in Govt. 1950; Ed. 1964; LL.M. 1971; George Washington University; C.P.A. 1965; State of Virginia
- Lyndale Harpster George, *Associate Professor Emeritus of Human Kinetics and Leisure Studies***
B.S. in P.E. 1948; M.A. in Ed. 1952; A.P.C. 1961; George Washington University
- Marvin Gordon, *Professor Emeritus of Geography and Regional Science***
B.A. 1942; City University of New York City College; M.A. 1954; Ph.D. 1966; Columbia University
- Robert Goulard, *Professor Emeritus of Engineering and Applied Science***
Ph.D. 1957; Purdue University
- Joseph Arthur Greenberg, *Professor Emeritus of Education***
B.S. in Bus.Ed. 1966; Salem State College; Ed.M. 1968; Ed.D. 1974; Boston University
- Donald Gross, *Professor Emeritus of Operations Research***
B.S. 1956; Carnegie Mellon University; M.S. 1959; Ph.D. 1962; Cornell University; P.E.
- Phillip Donald Grub, *Aryamehr Professor Emeritus of Multinational Management***
B.A., B.A. in Ed. 1953; Eastern Washington State College; M.B.A. 1960; D.B.A. 1964; George Washington University
- Robert Bernard Heller, *Professor Emeritus of Engineering and Applied Science***
B.S. 1946; M.S. 1948; Ph.D. 1951; St. Louis University
- Charles Joseph Herber, *Associate Professor Emeritus of European History and International Affairs***
B.A. 1952; Dickinson College; M.A. 1957; Ph.D. 1965; University of California, Berkeley
- Philip Henry Highfill, Jr., *Professor Emeritus of English***
B.A. 1942; Wake Forest University; M.A. 1948; Ph.D. 1950; University of North Carolina
- Peter Proal Hill, *Professor Emeritus of History and International Affairs; University Historian***
B.A. 1949; Tufts University; M.A. 1954; Boston University; Ph.D. 1966; George Washington University
- James William Hillis, *Professor Emeritus of Speech and Hearing***
B.S. 1952; University of Nebraska; M.A. 1957; University of Maryland; Ph.D. 1963; Ohio State University
- Denis Michael Hitchcock, *Associate Professor Emeritus of Art***
B.A. 1967; University of California, Los Angeles; M.F.A. 1970; Ph.D. 1977; Princeton University
- Herman Hedberg Hobbs, *Professor Emeritus of Physics***
B.S. 1953; M.S. 1955; George Washington University; Ph.D. 1958; University of Virginia
- Mary Alida Holman, *Professor Emeritus of Economics***
B.A. 1955; M.A. 1957; Ph.D. 1963; George Washington University
- Robert William Holmstrom, *Professor Emeritus of Psychology***
B.A. 1956; Trinity College (Connecticut); Ph.D. 1965; Duke University
- Gloria Lyon Horrworth, *Professor Emeritus of Education***
B.A. 1952; California State University, Los Angeles; M.A. 1961; California State University, Northridge; Ed.D. 1972; American University
- Ching-Yao Hsieh, *Professor Emeritus of Economics***
B.A. 1939; St. John's University, China; M.A. 1958; Ph.D. 1964; George Washington University
- Terry Lee Hufford, *Professor Emeritus of Botany***
B.S. 1961; M.A. 1962; Bowling Green State University; Ph.D. 1972; Ohio State University
- Robert Lee Humphrey, *Professor Emeritus of Anthropology***
B.A. 1962; American University; Ph.D. 1970; University of New Mexico
- Rita Klein Ives, *Professor Emeritus of Special Education***
B.S. 1953; University of Pittsburgh; M.A. in Ed. 1957; Ed.S. 1967; Ed.D. 1971; George Washington University
- Joe Lee Jessup, *Professor Emeritus of Business Administration***
B.S. in B.A. 1936; University of Alabama; M.B.A. 1941; Harvard University; LL.D. 1964; University of Chungang, Korea
- Eva Mayne Johnson, *Professor Emeritus of Psychology***
B.A. 1949; M.A. 1951; Ph.D. 1957; George Washington University
- Nancy Diers Johnson, *Associate Professor Emeritus of Dance***
B.S. 1955; University of Minnesota; M.A. 1966; University of Iowa; Ed.D. 1980; University of North Carolina at Greensboro
- William Reid Johnson, *Associate Professor Emeritus of History and International Affairs***
B.A. 1951; Oberlin College; M.A. 1955; Ph.D. 1961; University of Washington
- Robert Gean Jones, *Professor Emeritus of Religion***
B.A. 1947; Baylor University; B.D. 1950; M.A. 1957; Ph.D. 1959; Yale University

Stephen Arnold Karp, *Professor Emeritus of Psychology*

B.A. 1949, City University of New York, Brooklyn College; M.A. 1952, New School for Social Research; Ph.D. 1962, New York University

Samuel Kavruck, *Professor Emeritus of Education*

B.S. 1937, M.S. in Ed. 1939, City University of New York, City College; M.A. in Govt. 1950, Ed.D. 1954, George Washington University

John Kaye, *Professor Emeritus of Engineering and Applied Science*

B.S. in M.E. 1939, M.S. in M.E. 1948, California Institute of Technology

John Whitefield Kendrick, *Professor Emeritus of Economics*

B.A. 1937, M.A. 1939, University of North Carolina; Ph.D. 1955, George Washington University

Robert Wayne Kenny, *Professor Emeritus of History*

B.I. 1953, University of Texas; M.A. 1957, University of Minnesota; Ph.D. 1963, University of Chicago; M.F.A. 1984, George Washington University

Young C. Kim, *Professor Emeritus of Political Science and International Affairs*

M.A. 1956, Vanderbilt University; Ph.D. 1958, University of Pennsylvania

Phyllis Dawn Kind, *Professor Emeritus of Microbiology and Immunology and of Genetics*

B.A. 1955, Montana State University; M.S. 1956, Ph.D. 1960, University of Michigan

James Cecil King, *Professor Emeritus of German*

B.A. 1949, M.A. 1950, Ph.D. 1954, George Washington University

Ali Muhlis Kiper, *Professor Emeritus of Engineering*

M.S. in M.E. 1950, Technical University of Istanbul, Turkey; M.S. in M.E. 1954, Ph.D. 1956, Purdue University, P.E.

Virginia Randolph Kirkbride, *Professor Emeritus of Educational Psychology*

B.A. 1941, M.A. 1942, University of Nebraska; Ed.D. 1959, George Washington University

Arthur David Kirsch, *Professor Emeritus of Statistics and of Psychology*

B.A. 1955, George Washington University; M.S. 1956, Ph.D. 1957, Purdue University

Vladislav Klein, *Professor Emeritus of Engineering*

Mech.Engr. 1954, Technical University, Czechoslovakia; Ph.D. 1974, Cranfield Institute of Technology, England

Philip Klubes, *Professor Emeritus of Pharmacology*

B.S. 1956, City University of New York, Queens College; M.S. 1959, Ph.D. 1962, University of Minnesota

Bruce Michael Kramer, *Professor Emeritus of Engineering and Applied Science*

B.S./M.S. 1972, Ph.D. 1979, Massachusetts Institute of Technology

Ruth Marilyn Krulfeld, *Professor Emeritus of Anthropology and International Affairs*

B.A. 1956, Brandeis University; Ph.D. 1974, Yale University

Frederick Charles Kurtz, *Professor Emeritus of Accountancy*

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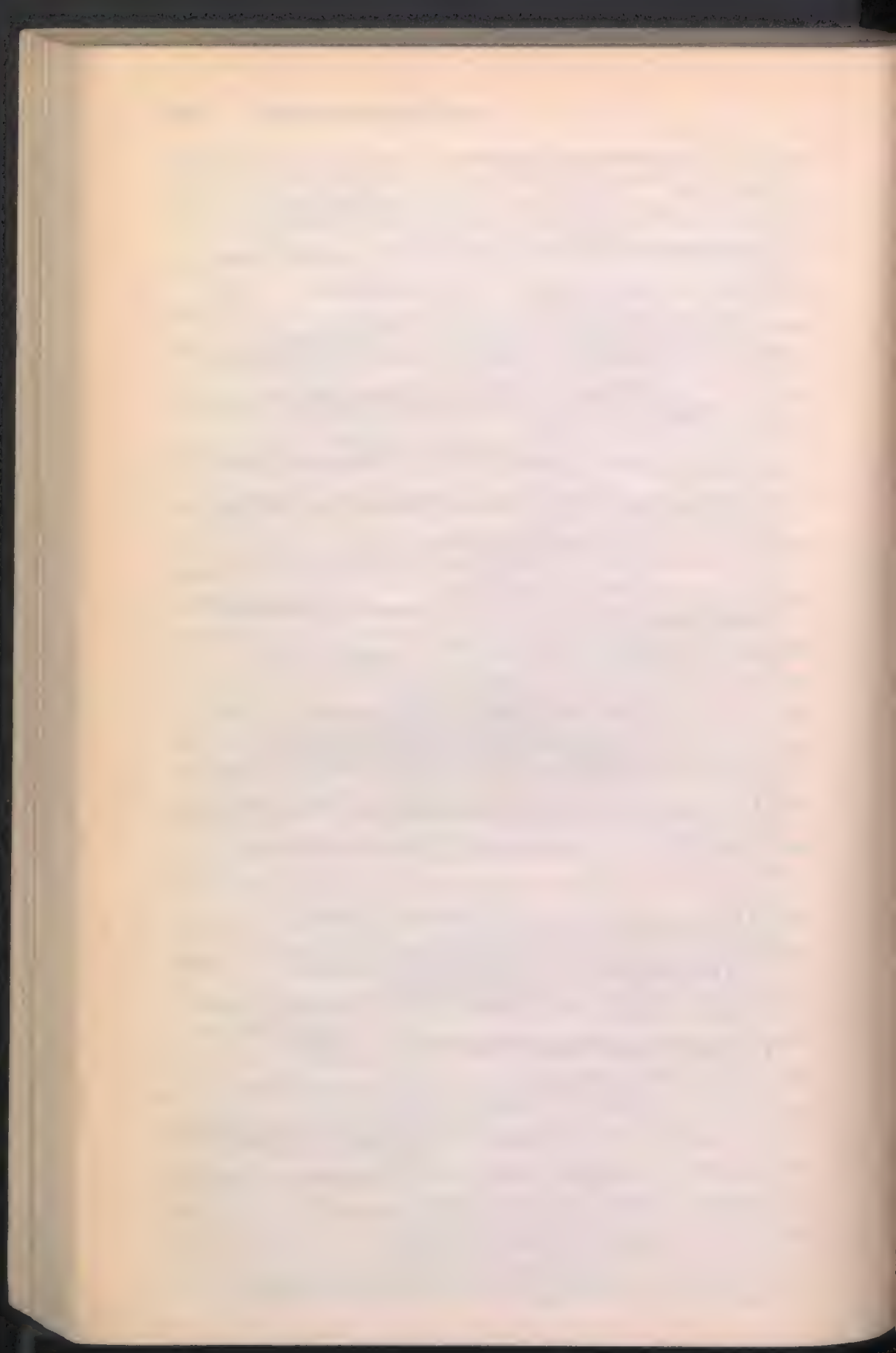
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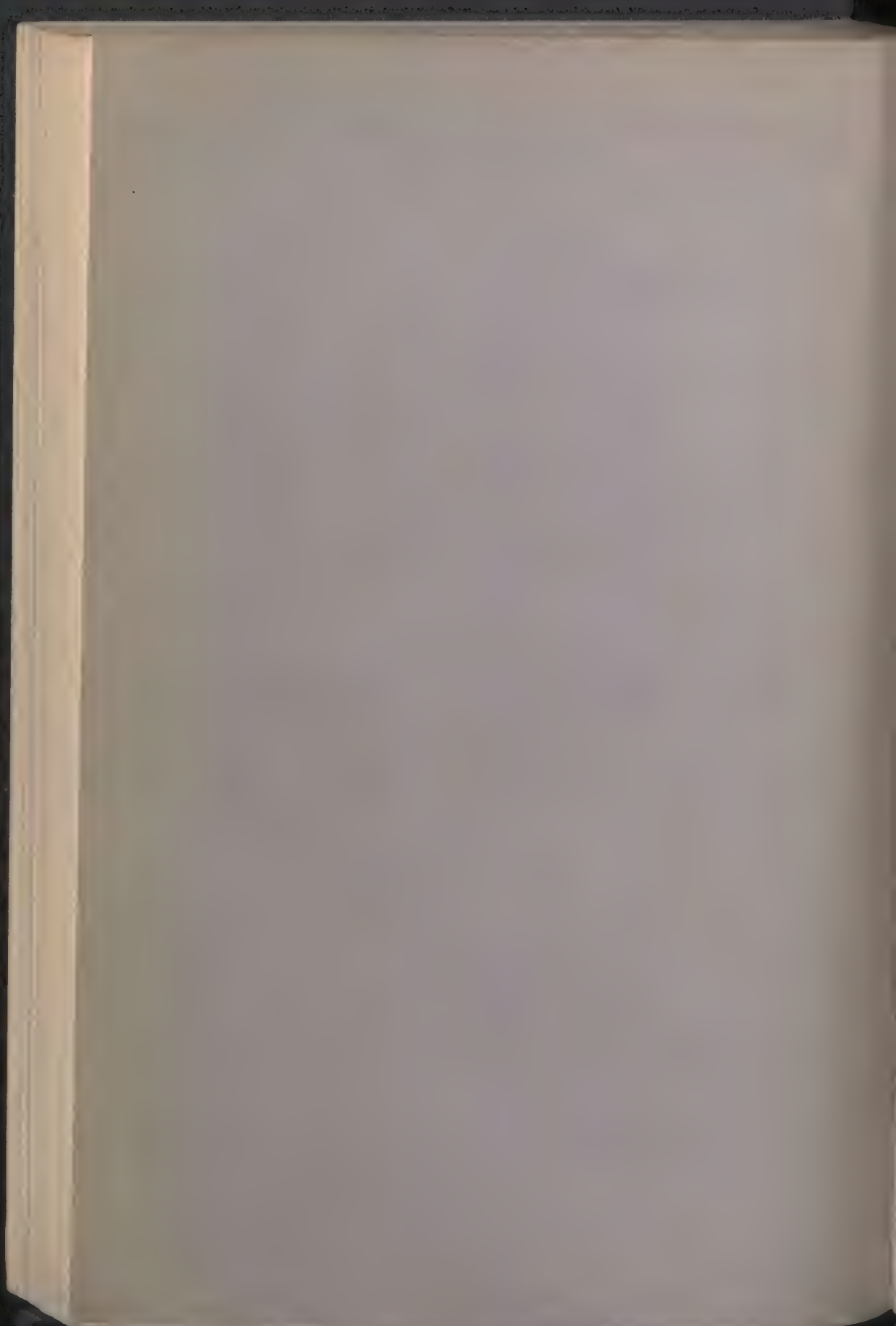
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DEGREES OFFERED BY THE GEORGE WASHINGTON UNIVERSITY

Columbian College of Arts and Sciences: Bachelor of Arts (B.A.), Bachelor of Fine Arts (B.F.A.), Bachelor of Music (B.Mus.), Bachelor of Science (B.S.), Master of Arts (M.A.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.F.S.), Master of Public Policy (M.P.P.), Master of Science (M.S.), Master of Science in Forensic Science (M.S.F.S.), Master of Philosophy (M.Phil.), Doctor of Philosophy (Ph.D.), and Doctor of Psychology (Psy.D.)

School of Medicine and Health Sciences: Bachelor of Science in Health Sciences (B.S.H.S.), Master of Science in Health Sciences (M.S.H.S.), and Doctor of Medicine (M.D.)

Law School: Juris Doctor (J.D.), Master of Laws (LL.M.), and Doctor of Juridical Science (S.J.D.)

School of Engineering and Applied Science: Bachelor of Science (Civil Engineering) (B.S.[C.E.]), Bachelor of Science (Computer Engineering) (B.S.[C.Eng.]), Bachelor of Science (Computer Science) (B.S.[C.S.]), Bachelor of Science (Electrical Engineering) (B.S.[E.E.]), Bachelor of Science (Mechanical Engineering) (B.S.[M.E.]), Bachelor of Science (Systems Engineering) (B.S.[S.E.]), Bachelor of Arts (B.A.), Master of Engineering Management (M.E.M.), Master of Science (M.S.), Engineer (Engr.), Applied Scientist (App.Sc.), and Doctor of Science (D.Sc.)

Graduate School of Education and Human Development: Master of Arts in Education and Human Development (M.A. in Ed.&H.D.), Master of Arts in Teaching (M.A.T.), Master of Education (M.Ed.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

School of Business and Public Management: Bachelor of Accountancy (B.Accy.), Bachelor of Business Administration (B.B.A.), Master of Accountancy (M.Accy.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Public Policy (M.P.P.), Master of Science in Finance (M.S.F.), Master of Science in Information Systems Technology (M.S.I.S.T.), Master of Science in Project Management (M.S.P.M.), Master of Tourism Administration (M.T.A.), and Doctor of Philosophy (Ph.D.)

Elliott School of International Affairs: Bachelor of Arts (B.A.), Master of Arts (M.A.), Master of International Policy and Practice (M.I.P.P.), and Master of International Studies (M.I.S.)

School of Public Health and Health Services: Bachelor of Science (B.S.), Master of Science (M.S.), Master of Public Health (M.P.H.), Master of Health Services Administration (M.H.S.A.), Specialist in Health Services Administration (Spec.H.S.A.), and Doctor of Public Health (Dr.P.H.)



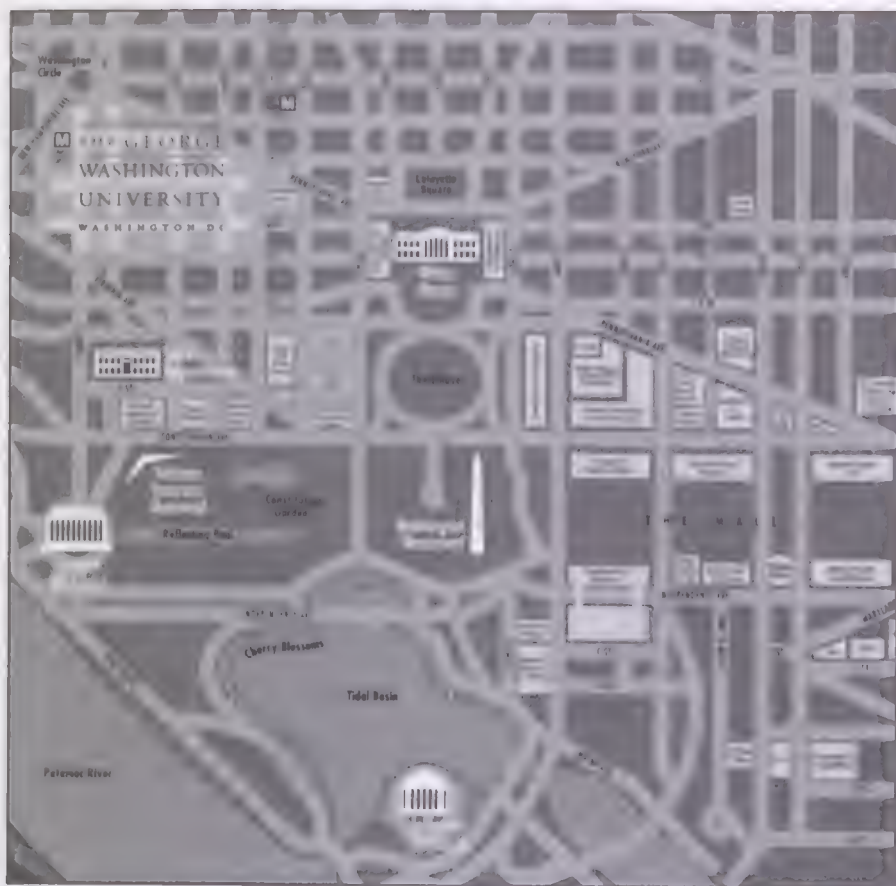
THE GEORGE
WASHINGTON
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The George
Washington
University
Bulletin

Graduate
Programs
2002–2003



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THE GEORGE WASHINGTON UNIVERSITY BULLETIN



GRADUATE PROGRAMS 2002-2003

Columbian College of Arts and Sciences
School of Business and Public Management
Graduate School of Education and Human Development
School of Engineering and Applied Science
Elliott School of International Affairs
College of Professional Studies

Please address correspondence to the office concerned at The George Washington University, Washington, D.C. 20052; telephone (202)994-1000. See page 16 for a brief directory of University offices. For information concerning Undergraduate Programs, the Law School, the School of Medicine and Health Sciences, the School of Public Health and Health Services, or the Summer Sessions, please request the appropriate Bulletin or see our website.

www.gwu.edu

喬治華盛頓大學願回答你的問題・如果書內沒有解答・請用英文書面詢問。地址見第一頁。

お問い合わせありがとうございました。同封の大学ガイドで不明の点は1ページ記載の各学部宛に英語でお問い合わせ下さい。

저희 대학에 관심을 가져주셔서 감사합니다. 혹시 이 책자에서 언급되지 않은 면에 대하여 의문나는 점이 있으시면 앞에 명기된 조지 워싱턴 대학교 주소로 영어로 문의해 주시기 바랍니다.

جامعة جورج واشنطن ترحب بكم وتشكر لكم اهتمامكم. برجاء الكتابة إلينا باللغة الانجليزية على عنواننا بالصفحة الأولى إذا كان لديكم أية استفسارات أخرى.

La Universidad de George Washington le agradece su interés. Si necesita información adicional a la incluida en este Boletín, por favor, dirijase por escrito, en inglés, a la dirección de George Washington University indicada en la primera página de esta publicación.

Information in this Bulletin is generally accurate as of fall 2001. The University reserves the right to change courses, programs, fees, and the academic calendar, or to make other changes deemed necessary or desirable, giving advance notice of change when possible.

Program information appears under the name of the department or program concerned in Columbian College of Arts and Sciences and the Elliott School of International Affairs. For the School of Business and Public Management, the Graduate School of Education and Human Development, and the School of Engineering and Applied Science, program information appears under the school's entry.

Message from the President



If you remember your Latin—it was required of all GW students until 1908—you may recall that *bulle* meant a small ball. From that we get *ballot* and *bullet*—and *bulletin*, which originally meant a brief notice, hurled into the public noise—like a bullet.

This bulletin is neither brief nor small. We have too much to tell you. For to flip through these pages is to see the extraordinary depth and variety of the experience at GW, a community of scholars exploring every area of knowledge, whether as small as the neutron or big as the Net.

Especially in this year it is also a reassuring sign of continuity. The events of last fall were both challenging and unbearably sad, creating a period in which for a while we seemed unable to absorb anything but what was on CNN. It was a time when we mourned alumni and friends lost in Washington and New York—and wondered whether students would shy away from applying to this school a few blocks from the White House.

In fact, the number of applications shot up. It was as if students dug in their heels, saying terrorists would not keep them from the university they most wanted to attend.

And now, this bulletin reminds us that even in the middle of crisis, learning goes on. The faculty at GW continue to explore the frontiers of human endeavor—and transmit what they've learned to those just beginning to explore.

Such activity goes on at a campus that is simply blossoming. Students who are with us in the year ahead will see us making full use of the new, fully functional Media and Public Affairs building, the new Lerner Family Health and Wellness Center, the new Elliott School. In this, our 90th year in Foggy Bottom and tenth at Loudoun-Dulles, we are transforming our Mount Vernon campus, thus extending our capacity to serve.

But despite the large implications we draw from this year's bulletin, the most important implication is the meaning it has for each of you. For contained within these covers are the descriptions of courses that, as they spread out over a year, will form the bulk of your own personal exploration at GW.

Approach these pages with all the care and thoughtfulness you can provide; it will provide you with a great education. If you use it well, it can have a lot of impact, just like a Florida ballot. And you'll have a ball. Maybe we haven't moved away from Latin as much as we think.

Best wishes.

Stephen Joel Trachtenberg

Stephen Joel Trachtenberg
President

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THE ACADEMIC CALENDAR 2002-2003

August 2002	September 2002	October 2002	November 2002
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S
1 2 3	1 2 3 4 5 6 7	1 2 3 4 5	1 2
4 5 6 7 8 9 10	8 9 10 11 12 13 14	6 7 8 9 10 11 12	3 4 5 6 7 8 9
11 12 13 14 15 16 17	15 16 17 18 19 20 21	13 14 15 16 17 18 19	10 11 12 13 14 15 16
18 19 20 21 22 23 24	22 23 24 25 26 27 28	20 21 22 23 24 25 26	17 18 19 20 21 22 23
25 26 27 28 29 30 31	29 30	27 28 29 30 31	24 25 26 27 28 29 30
December 2002	January 2003	February 2003	March 2003
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22 23 24 25 26 27 28	19 20 21 22 23 24 25	16 17 18 19 20 21 22	16 17 18 19 20 21 22
29 30 31	26 27 28 29 30 31	23 24 25 26 27 28	23 24 25 26 27 28 29
		30 31	30 31
April 2003	May 2003	June 2003	July 2003
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5	1 2 3	1 2 3 4 5 6 7	1 2 3 4 5
6 7 8 9 10 11 12	4 5 6 7 8 9 10	8 9 10 11 12 13 14	6 7 8 9 10 11 12
13 14 15 16 17 18 19	11 12 13 14 15 16 17	15 16 17 18 19 20 21	13 14 15 16 17 18 19
20 21 22 23 24 25 26	18 19 20 21 22 23 24	22 23 24 25 26 27 28	20 21 22 23 24 25 26
27 28 29 30	25 26 27 28 29 30 31	29 30	27 28 29 30 31

2002 Fall Semester

August 29-30	Advising and testing begin for entering students
September 3	Classes begin
September 3-13	Late registration
October 1	Applications due for winter graduation
October 30	Registration for spring semester classes begins*
November 28-29	Thanksgiving holiday
December 9	Last day of regular fall semester classes
December 10	Makeup classes
December 11-12	Reading period
December 13-21	Examination period

2003 Spring Semester

January 10	Advising and testing for entering students
January 13	Classes begin
January 13-24	Late registration
January 20	Martin Luther King, Jr., Day (holiday)
February 1	Applications due for May graduation
February 17	George Washington's birthday observed (holiday)
March 17-21	Spring recess
March 26	Registration for fall semester classes begins*
April 29	Makeup classes
April 30	Last day of regular spring semester classes
	Designated Monday
May 1-2	Reading period
May 5-13	Examination period
May 18	Commencement

*Registration dates are tentative; consult the *Schedule of Classes*.

The University

PRESIDENTS OF THE UNIVERSITY

1821-1827	William Staughton
1828-1841	Stephen Chapin
1843-1854	Joel Smith Bacon
1855-1858	Joseph Getchell Binney
1859-1871	George Whitefield Samson
1871-1894	James Clarke Welling
1894-1895	Samuel Harrison Greene, <i>Acting</i>
1895-1900	Benaiah L. Whitman
1900-1902	Samuel Harrison Greene, <i>Acting</i>
1902-1910	Charles Willis Needham
1910-1918	Charles Herbert Stockton
1918-1921	William Miller Collier
1921-1923	Howard L. Hodgkins, <i>ad interim</i>
1923-1927	William Mather Lewis
1927-1959	Cloyd Heck Marvin
1959-1961	Oswald Symister Colclough, <i>Acting</i>
1961-1964	Thomas Henry Carroll
1964-1965	Oswald Symister Colclough, <i>Acting</i>
1965-1988	Lloyd Hartman Elliott
1988-	Stephen Joel Trachtenberg

ABOUT THE UNIVERSITY

George Washington was determined to have a great national university in the nation's capital. His hope was that students from all parts of the country would gain a first hand knowledge of the practice as well as the theory of republican government while being instructed in the arts and sciences. He bequeathed 50 shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." Despite Washington's intentions, The Potomac Company folded and Congress never extended a "fostering hand," so the University did not take shape until a group of Baptist clergymen led by Reverend Luther Rice took up the cause. They raised funds for the purchase of a site and petitioned Congress for a charter. Congress insisted on giving the institution a non-sectarian charter which stated "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

Columbian College, as it was originally named, took up residence on College Hill, a 46-acre tract between the present 14th and 15th Streets extending from Florida Avenue to Columbia Road. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University.

By 1918, the University had moved to the Foggy Bottom neighborhood—between 19th and 24th Streets, south of Pennsylvania Avenue—in the heart of Washington, D.C. The more than 90 buildings, including 14 residence halls, are situated on 43 acres bordered by the White House, the John F. Kennedy Center for the Performing Arts, the State Department, and the World Bank, as well as numerous federal agencies, national galleries and museums.

GW's Virginia Campus, initiated for graduate studies, research projects, and professional development programs, is located along the high-tech corridor on Route 7, just to the west of Route 28, in Loudoun County. In 1998, GW established The George Washington University at Mount Vernon College in order to offer unique living and learning opportunities for women. GW's Mount Vernon Campus is located on Foxhall Road in Northwest Washington.

Currently, the University's enrollments total more than 20,000, of which over 8,000 are undergraduate students, over 10,000 are graduate and professional students, and about 1,600 are nondegree students. The students come from all 50 states and 139 different countries.

Mission Statement

The George Washington University, an independent academic institution chartered by the Congress of the United States in 1821, dedicates itself to furthering human well-being. The University values a dynamic, student-focused community stimulated by cultural and intellectual diversity and built upon a foundation of integrity, creativity, and openness to the exploration of new ideas.

The George Washington University, centered in the national and international crossroads of Washington, D.C., commits itself to excellence in the creation, dissemination, and application of knowledge.

To promote the process of lifelong learning from both global and integrative perspectives, the University provides a stimulating intellectual environment for its diverse students and faculty. By fostering excellence in teaching, the University offers outstanding learning experiences for full-time and part-time students in undergraduate, graduate, and professional programs in Washington, D.C., the nation, and abroad. As a center for intellectual inquiry and research, the University emphasizes the linkage between basic and applied scholarship, insisting that the practical be grounded in knowledge and theory. The University acts

as a catalyst for creativity in the arts, the sciences, and the professions by encouraging interaction among its students, faculty, staff, alumni, and the communities it serves.

The George Washington University draws upon the rich array of resources from the National Capital Area to enhance its educational endeavors. In return, the University, through its students, faculty, staff, and alumni, contributes talent and knowledge to improve the quality of life in metropolitan Washington, D.C.

The Schools

The George Washington University includes nine academic units, as follows:

Columbian College of Arts and Sciences offers programs leading to the degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Fine Arts, Bachelor of Music, Master of Arts, Master of Fine Arts, Master of Forensic Sciences, Master of Public Policy, Master of Science, Master of Science in Forensic Science, Master of Philosophy, Doctor of Philosophy, and Doctor of Psychology.

The School of Medicine and Health Sciences offers programs leading to the degrees of Bachelor of Science in Health Sciences, Master of Science in Health Sciences, and Doctor of Medicine.

The Law School offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of Juridical Science.

The School of Engineering and Applied Science offers programs leading to the degree of Bachelor of Science in the following areas: civil engineering, computer engineering, computer science, electrical engineering, mechanical engineering, and systems engineering; and Bachelor of Arts in the areas of applied science and technology and of computer science. Graduate programs lead to the degrees of Master of Science, Master of Engineering Management, Engineer, Applied Scientist, and Doctor of Science.

The Graduate School of Education and Human Development offers programs leading to the degrees of Master of Arts in Education and Human Development, Master of Arts in Teaching, Master of Education, Education Specialist, and Doctor of Education.

The School of Business and Public Management offers programs leading to the degrees of Bachelor of Accountancy, Bachelor of Business Administration, Master of Accountancy, Master of Business Administration, Master of Public Administration, Master of Public Policy, Master of Science in Finance, Master of Science in Information Systems Technology, Master of Science in Project Management, Master of Tourism Administration, and Doctor of Philosophy.

The Elliott School of International Affairs offers programs leading to the degrees of Bachelor of Arts, Master of Arts, Master of International Policy and Practice, and Master of International Studies.

The School of Public Health and Health Services offers programs leading to the degrees of Bachelor of Science, Master of Science, Master of Public Health, Master of Health Services Administration, Specialist in Health Services Administration, and Doctor of Public Health.

The College of Professional Studies has been authorized to offer programs leading to the degrees of Associate in Professional Studies, Bachelor of Professional Studies, and Master of Professional Studies.

Accreditation

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Board.

The Law School is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association.

The School of Medicine and Health Sciences has had continuous approval by its accrediting body, which is currently the Liaison Committee on Medical Education, sponsored jointly by the American Medical Association and the Association of American Medical Colleges. The clinical laboratory science program is accredited by the National Accrediting Agency for Clinical Laboratory Science. The Commission on Accreditation of Allied Health Education Programs has accredited the health sciences programs in diagnostic medical sonography and physician assistant and the athletic training concentration in exercise science in the School of Public Health and Health Services. The public health programs have full accreditation from the Council on Education for Public Health. The program in health services administration is accredited by the Accrediting Commission on Education for Health Services Administration.

All Bachelor of Science engineering curricula of the School of Engineering and Applied Science are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The Bachelor of Science computer science curriculum is accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board.

The Graduate School of Education and Human Development is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its eligible master's and doctoral degree programs; the master's programs in school and community counseling and the doctoral program in counseling are accredited by the Council for the Accreditation of Counseling and Related Educational Programs; the master's program in rehabilitation counseling is accredited by the Council on Rehabilitation Education.

The School of Business and Public Management joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of AACSB International—The Association to Advance Collegiate Schools of Business; the Association accredited its undergraduate program in 1977 and its master's program in 1982. The programs in accountancy satisfy the educational requirements for the Certified Public Accountant and the Certified Management Accountant professional examinations. The Master of Public Administration program is on the approved list of the National Association of Schools of Public Affairs and Administration.

The Elliott School of International Affairs is a member of the Association of Professional Schools of International Affairs.

The Bachelor of Fine Arts with a major in interior design is accredited by the Foundation for Interior Design Education Research. The Department of Chemistry is on the approved list of the American Chemical Society. The Department of Music is an accredited member of the National Association of Schools of Music. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The graduate program in speech-language pathology is accredited by the Education and Training Board of the Boards of Examiners in Speech-Language Pathology and Audiology.

The Board of Trustees of the University

The University is privately endowed and is governed by a Board of Trustees of which the President of the University is an *ex officio* member. Trustees who are GW alumni are indicated by an asterisk. Locations are indicated for trustees outside the Washington metropolitan area.

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 Carolynn Reid-Wallace, *Secretary*
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- *Jin H. Ahn, *President, Persimmon Group*
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The Schools

- Columbian College of Arts and Sciences**—Interim Dean Jean Folkerts; Executive Associate Dean Edward Alan Caress; Associate Deans F. Christopher Arterton, Norayr Krikor Khatcheressian, Kim Moreland, Michael Moses, Mary Anne Plastino Saunders
School of Medicine and Health Sciences—Dean John Franklin Williams, Jr.; Senior Associate Deans Mark Batshaw, Jean E. Johnson; Associate Deans Stephen Evans, Rhonda M. Goldberg, Brian J. McGrath, W. Scott Schroth, James L. Scott

- Law School**—*Dean Michael K. Young; Senior Associate Dean Roger H. Trangsrud; Associate Deans Alfreda Robinson, Eric Scott Sirulnik, Ralph Gustav Steinhardt, Robert V. Stanek, Thomas A. Morrison, Renee Y. DeVigne, Scott B. Pagel, Raj K. Bhala, Richard J. Pierce*
- School of Engineering and Applied Science**—*Dean Timothy Tong; Associate Dean Rachelle Silverman Heller*
- Graduate School of Education and Human Development**—*Dean Mary Hatwood Futrell; Associate Deans Janet Craig Heddesheimer, Robert Nicholas Ianacone*
- School of Business and Public Management**—*Dean Susan Phillips; Senior Associate Dean D. Jeffrey Lenn; Associate Deans Joel W. Cook, Debra R. Sheldon*
- Elliott School of International Affairs**—*Dean Harry Harding; Associate Deans Harvey B. Feigenbaum, Barbara Diane Miller*
- School of Public Health and Health Services**—*Interim Dean Richard M. Fairfax Southby; Senior Associate Dean Daniel Allen Hoffman*
- College of Professional Studies**—*Dean Roger Whitaker*

The Faculty Senate

In addition to the elected members listed below, the President of the University is *ex officio*: the Vice President for Academic Affairs, the University Registrar, and the deans of the schools are administrative members; and a parliamentarian is selected by the Faculty Senate.

- Lilien Filipovitch Robinson, *Professor of Art and Chair of the Executive Committee*
- Michael Scott Castelberry, *Professor of Special Education*
- James Francis Cawley, *Professor of Prevention and Community Health*
- Salvatore Frank Divita, *Professor of Marketing*
- Paul Brooks Duff, *Associate Professor of Religion*
- Linda Lou Gallo, *Professor of Biochemistry and Molecular Biology*
- John L. Glascock, *Professor of Finance*
- William Byron Griffith, *Professor of Philosophy*
- Murli Manohar Gupta, *Professor of Mathematics*
- Muhammad Ikramul Haque, *Professor of Engineering and Applied Science*
- Robert Joseph Harrington, *Professor of Engineering and Applied Science*
- Carol Hren Hoare, *Professor of Human Development and Human Resource Development*
- Gerald Philip Johnston, *Professor of Law*
- R. Emmet Kennedy, *Professor of European History*
- Gregory E. Maggs, *Professor of Law*
- David Willard McAleavey, *Professor of English*
- Bernard Matthew Mergen, *Professor of American Civilization*
- J. Houston Miller, *Professor of Chemistry*
- Thomas J. Nagy, *Associate Professor of Expert Systems*
- Joseph Pelzman, *Professor of Economics*
- Gary Leonard Simon, *Professor of Medicine*
- Richard Thornton, *Professor of History and International Affairs*
- Lynda L. West, *Professor of Special Education*
- Arthur Edward Wilmarth, Jr., *Associate Professor of Law*
- Anthony Marvin Yezer, *Professor of Economics*
- Mona Elwakkad Zaghloul, *Professor of Engineering and Applied Science*

Directory of University Offices

General Information (202)994-4949

Administrative Offices

President	Rice Hall 802	(202)994-6500
Board of Trustees	Rice Hall 801	(202)994-8610
Vice President for Academic Affairs	Rice Hall 813	(202)994-6510
Vice President for Advancement	2129 I Street, NW	(202)994-6415
Vice President for Communications	Rice Hall 504	(202)994-8810
Vice President and General Counsel	2100 Penn Ave., #525	(202)994-6503
Vice President for Health Affairs	Ross Hall 713	(202)994-4356
Vice President for Student and Academic Support Services	Rice Hall 402	(202)994-7210
Vice President and Treasurer	Rice Hall 701	(202)994-6600
Columbian School of Arts and Sciences	Phillips 107	(202)994-6210
School of Business and Public Management	Government 206	(202)994-6380
Graduate School of Education and Human Development	2134 G Street, NW	(202)994-6160
School of Engineering and Applied Science	Tompkins Hall 110	(202)994-6080
Elliott School of International Affairs	Lisner Hall 640	(202)994-6240
Law School	Lerner 102	(202)994-6288
School of Medicine and Health Sciences	Ross Hall 713	(202)994-3506
School of Public Health and Health Services	Ross Hall 125	(202)994-5179
College of Professional Studies	805 21st Street, NW, #700	(202)994-2083

Student Services Offices

Career Center	1922 F Street, NW	(202)994-6495
Community Living and Learning Center	Fulbright Hall 104	(202)994-8345
Counseling Center	2033 K Street, NW, #330	(202)994-5300
Dean of Students	Rice Hall 401	(202)994-6710
Disability Support Services	Marvin Center 436	(202)994-8250
Fellowships and Graduate Student Support	Rice Hall 603	(202)994-6822
Gelman Library	2130 H Street, NW	(202)994-6845
Graduate Student Enrollment Management	Rice Hall 602	(202)994-5984
GW Bookstore	Marvin Center	(202)994-6870
Housing Services	Fulbright Hall 104	(202)994-6688
Information Technology Services	Rome B101	(202)994-5530
International Services	2127 G Street, NW	(202)994-6860
Mount Vernon Campus	2100 Foxhall Road, NW	(202)242-6602
Office of University Students	812 20th Street, NW	(202)994-1972
Student Accounts Services	Rome 102	(202)994-7350
Student Activities Center	Marvin Center 427	(202)994-6555
Student Financial Assistance	Rice Hall 310	(202)994-6620
Summer, Special, and International Programs	812 20th Street, NW	(202)994-6360
Undergraduate Admissions	Rice Hall 2nd Floor	(202)994-6040
University Honors Program	2138 G Street, NW	(202)994-6816
University Registrar	Rice Hall 101	(202)994-4900
Virginia Campus	Ashburn, VA	(703)729-8200

FEES AND FINANCIAL REGULATIONS

Fees paid by students cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution makes up the difference.

The following fees and financial regulations were adopted for on-campus programs for the academic year 2002-03. Information on tuition and fees for off-campus programs is published separately by the College of Professional Studies. Information on tuition and fees for the summer is published in the Summer Sessions Announcement.

Tuition Fees

For on-campus graduate study in Columbian College of Arts and Sciences, the School of Business and Public Management, the Graduate School of Education and Human Development, the School of Engineering and Applied Science, and the Elliott School of International Affairs: Graduate students taking credit courses at all levels are charged \$810 per credit hour on the main campus and \$650 per credit hour at the Virginia campus. Doctoral study in the School of Business and Public Management is charged at the rate of \$11,520 for two semesters. Nondegree students taking courses on the main campus are charged \$877.50 per credit hour.

The following Virginia campus programs are each charged at a single fee for the full program: In the School of Business and Public Management, the Executive Master of Science in Information Systems Technology, \$27,980, and the Executive Master of Business Administration, \$63,000. In the Graduate School of Education and Human Development, leading to the degree of Doctor of Education, the Executive Leadership in Human Resource Development Program, \$49,735, and the Higher Education Administration Program, \$48,000. In the School of Engineering and Applied Science, the Executive Master of Engineering Management and the Master of Science in the field of Telecommunications and Computers, \$29,960.

Voluntary Library Fee—The Registration Schedule and Invoice includes a voluntary gift for the University libraries. Check the box labeled "Library Gift Decline" and omit the amount from your payment if you do not wish to include the library gift in your reimbursement to the University.

Continuing Research—All master's and doctoral students who have completed their required number of credits (including course work and thesis or dissertation research) must register each subsequent fall and spring semester for 1 credit hour of Continuing Research as specified by the regulations of the school concerned.

Additional Course Fees—Some courses carry additional fees, such as laboratory or material fees, charged by semester as indicated in course descriptions.

Special Fees and Deposits (Nonrefundable)

Application fee (all degree candidates)	\$55
Student Association fee, per credit hour, to a maximum of \$15 per semester	1
Late registration beginning the first week of the semester	80
Registration for continuous enrollment or leave of absence	35
Registration for Virginia campus courses	35
Graduation fee	100
Late-payment fee (see Payment of Fees, below)	75
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for any reason	25

Binding master's thesis	30
Microfilm service and binding dissertation	130
Elliott School of International Affairs fee (payable over four semesters [fall and spring] at \$625 per semester for Master of Arts candidates and over two semesters [fall and spring] at \$1,250 per semester for Master of International Policy and Practice candidates)	2,500
Engineers' Council fee (charged all SEAS students), per semester	8
English test for international students (when required)	20
Transcript fee	5
Replacement of lost or stolen picture identification card	25
Replacement of diploma	50

Payment of tuition for thesis or dissertation research entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis or dissertation is to be written.

Postdoctoral Study

Those who have graduated from George Washington University with a Ph.D., Ed.D., or D.Sc. may continue any studies in the University without payment of tuition (contingent upon the availability of space) and may enjoy all University library privileges. Such graduates are required to pay the prevailing charge for one credit hour, as well as the University fee, in order to establish their active membership in the University. The use of laboratory space and equipment is contingent upon availability, and the cost of all laboratory or special library material is paid by the graduate. Special arrangements for such privileges must be made with the dean two months in advance of the semester in which the graduate wishes to register. Postdoctoral work taken under this privilege may not be taken for credit.

Payment of Fees

A student who registers for classes in any semester or session incurs a financial obligation to the University. Payment of tuition and fees, as detailed on the Schedule and Invoice, is due approximately two weeks prior to the first day of classes. Changes to registration that affect charges to the student's account must be recorded through the Office of the Registrar. In addition to payment of tuition and fees, the University requires that a student confirm his or her registration. Students whose registrations are not confirmed by the third week of the semester may be canceled from all courses. Receipt of the tear-off portion of the Schedule and Invoice, typically mailed with the student's payment, is requested for confirmation of registration. All students whose registrations are not confirmed are notified in writing that their registrations will be canceled and are asked to contact the Student Accounts Office immediately.

Charges for residence halls and meal plans are in accordance with lease agreements signed by the student; questions concerning those charges should be referred to the Community Living and Learning Center or Auxiliary and Institutional Services, respectively.

The University offers several options for payment of tuition and fees in addition to payment in full upon receipt of the Schedule and Invoice or at the time of registration.

Deferred Payment Plan—Any student registered for 6 or more credit hours may be eligible to participate in this plan. Advance arrangements are not required. Students who receive GW employee tuition benefits or departmental tuition awards are not eligible to participate in this plan unless the student's balance after awards are deducted is greater than \$3,000. An eligible student may use the deferred pay-

ment plan by paying the minimum amount due for the semester as specified. The remaining balance plus accrued interest is due by the eighth week of classes. Interest on unpaid balances is charged at the rate of 12% per annum beginning the first day of classes each semester. If payment in full is not received by the end of the eighth week of the semester, interest will continue to accrue at the rate previously stated and the account will be assessed a \$75 late payment fee.

Monthly Payment Plan—This University payment plan is open to all students and is available for the fall and spring semesters only. Students must complete and submit an application by August 15 for the academic year or by January 5 for the spring semester to participate in the plan. Upon approval of the application, the University will furnish coupons and return address labels for each payment. The monthly payment plan for the academic year begins in June and ends in March, with the first five payments applied to the fall account and the second five applied to spring. For spring semester only, the plan begins in November and ends in March. Under the plan, all payments are due on the first of each month. The student will receive a monthly bill, but no interest or late fees will be charged provided payments are received as scheduled. Students who enroll in the plan after the first month must make up all payments to the month of enrollment. Interest and a \$75 late payment fee are assessed all accounts not paid in full by October 1 for fall and March 1 for spring.

Third-Party Billing—The University accepts employer vouchers or purchase orders that are not contingent upon receipt of grades. Under all circumstances, however, the charges for tuition and fees remain the responsibility of the student. Should a sponsor fail to remit payment to the University, the University will contact the student for payment. A student whose employer or sponsor reimburses him or her for tuition and fees after receipt of grades must pay in full by the stated due date to avoid interest, late fees, and/or cancellation of registration. Students whose tuition is paid in full or part by employee benefits or teacher tuition remission must pay any remaining balance by the stated due date to avoid interest, late fees, and/or cancellation of registration.

Accounts that are past due are encumbered by the University. A student whose account is encumbered may not register for future semesters and may not receive diplomas or transcripts. Accounts that are more than 90 days past due are referred to an agency for collection. The student is then responsible for all charges due the University as well as all collection costs incurred by the agency.

A student whose check is returned unpaid by the bank for any reason will be charged a returned check fee.

Withdrawals and Refunds

Applications for withdrawal from the University or from a course after the registration period must be made in writing to the dean of the school or division and to the registrar. Notification to an instructor is not an acceptable notice (see Withdrawal under University Regulations). Financial aid recipients must notify the Office of Student Financial Assistance in writing.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. Complete withdrawal from all courses (on-campus students):

Withdrawal dated on or before the end of the first week of the semester	80%
Withdrawal dated on or before the end of the second week of the semester . . .	60%
Withdrawal dated on or before the end of the third week of the semester	40%
Withdrawal dated on or before the end of the fourth week of the semester . . .	25%
Withdrawal dated after the fourth week of the semester	None

2. Partial withdrawal: If the change in program results in a lower tuition charge, the refund schedule above applies to the difference.

3. **Regulations governing student withdrawals as they relate to residence hall and food service charges** are contained in the specific lease arrangements.
4. **Summer Sessions:** In cases of authorized withdrawals from courses, refunds of 75% of tuition and fees will be made for courses dropped within the first seven calendar days of the start of a session. No refund will be made for courses dropped thereafter.

The above information regarding cancellation of tuition charges and fees after withdrawal from the University may not apply to entering students who are recipients of federal aid; those students should check with the Student Accounts Office for the applicable cancellation schedule.

Refund policies of the University are in conformity with guidelines for refunds as adopted by the American Council on Education. Federal regulations require that financial aid recipients use such refunds to repay financial aid received for that semester's attendance. This policy applies to institutional aid as well.

In no case will tuition be reduced or refunded because of absence from classes.

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

FINANCIAL AID

The George Washington University offers a program of financial support for students, which includes assistantships, fellowships, traineeships, graduate scholarships, research appointments, part-time employment, the Federal Work-Study Program, and loans. Several forms of aid not based on financial need are available. In general, consideration for financial aid is restricted to students in good academic standing who meet the minimum grade-point average for particular awards and are not financially encumbered by any other University office.

The University reserves the right to ask for documentation necessary to determine aid eligibility. Documents submitted as part of aid applications become the property of the University and cannot be returned. Federal regulations require that the University report suspected cases of fraud or misrepresentation to the appropriate federal, state, and local authorities.

Gift aid (scholarships, grants, fellowships, assistantships, tuition awards, etc.) is taxable to the extent that it exceeds the allowable costs of tuition, fees, and required books and supplies or is dedicated to other costs, such as room and board. Federal grants may be taxable if, together with other gift assistance, they exceed the allowable costs.

Application and correspondence concerning assistantships, fellowships, traineeships, or graduate scholarships should be sent directly to the school concerned at The George Washington University. Unless otherwise specified, application and supporting credentials should be submitted no later than February 1 preceding the academic year for which the award is made. Application for admission to graduate study is a prerequisite for consideration.

Information in this section is accurate at the time this Bulletin is prepared for press. Future changes in federal regulations or institutional policies may alter the application requirements or program guidelines.

Office of Fellowships and Graduate Student Support

The Office of Fellowships and Graduate Student Support provides information on awards that may be used in support of graduate study. These awards are generally sponsored by foundations, professional and learned societies, industries, and other organizations. Assistance is also offered to those wishing to apply for such prestigious fellowships as the Rhodes, Marshall, National Science Foundation, Fulbright, Luce, Gates, and Mitchell. Detailed information is available at <http://www.gwu.edu/~fellows/fellows.html>.

These services are provided to entering and enrolled graduate students, to enrolled undergraduates planning for graduate study, and to alumni.

Assistantships

Research Assistantships—May be available in departments with faculty who are participating in sponsored research.

Research Scholar Assistantships—School of Engineering and Applied Science, GW/NASA—Langley Joint Institute for the Advancement of Flight Sciences, and Program for Research and Education in Space Technology, GW/NASA—Goddard Space Flight Center.

Graduate Teaching Assistantships—Available to graduate students in master's and doctoral programs in most departments of the University. A graduate teaching assistant receives financial compensation for a designated unit of service to the assistant's major department of instruction. All new graduate teaching assistants must attend an orientation and evaluation program.

Community Facilitators—Available to graduate students in any field of study who are interested in working in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes salary and a furnished room for the academic year. All positions are part time, and staff members are required to enroll as full-time students in degree programs. Further information may be obtained from the Community Living and Learning Center.

Fellowships, Scholarships, and Related Programs

University Fellowships—Available to graduate students in master's and doctoral programs in most departments of the University. Fellowships are based on scholarship and each fellow may receive a stipend and/or tuition allowance.

Research Traineeships—Available under numerous sponsored programs in a number of departments. Awards vary; information is available from the departments.

Other Fellowships, Scholarships, and Related Programs

Achievement Rewards for College Scientists Scholarships

American Civilization Fellowships

American Civilization Internships (Smithsonian Institution—

George Washington University Cooperative Program)

American National Red Cross Fellowships

Angeline Anderson Scholarship Fund

Aryamehr Research Fellowships

Robert R. Banville Scholarship Fund

Syven Seid Beck Endowment Fund for Elementary Education

Bell Atlantic Graduate Fellowships

Bender Scholarship to the University of Cambridge

Florence Bichan/Scottish Rite Scholarships

Mary Darnell Blaney Fellowship in International Relations

Winfield Scott Blaney Fellowship in International Relations

John and Claudia Boswell Scholarship Fund

Letitia Woods Brown Fellowship in African American History
Brown Scholarship Fund
Business Administration Departmental Fellowships
Career Development Scholarships
Oliver T. Carr, Jr., Scholarship
Oliver T. Carr, Sr., Memorial Fellowship
Center for Washington Area Studies Fellowship
James Edward Miller Chapman Educational Foundation Scholarship
Children's National Medical Center Fellowships in Biomedical Sciences
Daewoo Corporation Scholarships
Maria Davis European Studies Fellowships
Vincent J. DeAngelis Scholarship Fund
Deixler/Swain Graduate Scholarship in History
Dockery Endowment Scholarship
Eaves-Carden Graduate Scholarship
King Fahd Fund
James Harold Fox Scholarship Fund
Mary Hatwood Futrell Scholarship Fund
Global Leaders Fellowships
Leo and Lillian Goodwin Endowment Scholarship
Graduate Engineering Honors Fellowship Program
Green Scholarship Fund
Gruss Scholarship Fund
Hampel Scholarship
Bryce Harlow Foundation Scholarships
Elizabeth Earle Heckmann Graduate Scholarship
Herbst Family Graduate Fund
Thelma Hunt Graduate Fellowships in Psychology
Hyundai Scholarship Fund
Albert A. and Esther C. Jones Scholarship Fund
Allen M. Jones Scholarship Fund
Marvin L. Kay Fellowship in Finance
Rita H. Keller Scholarship Fund
Kendrick Graduate Fellowship
Isabella Osborn King Research Fellowships
Larry King Graduate Scholarship
Wolfgang and Astrid Kraus Graduate Scholarships
Leviton Endowment Fellowships
Myron L. Loe Graduate Student Scholarship
Mary and Daniel Loughran Graduate Scholarships
Morris Louis Fellowship in Painting
Machen Graduate Fellowship in Civil Engineering
J. Willard Marriott Foundation Graduate Scholarships
George McCandlish Fellowship in American Literature
National Association of Purchasing Management Fellowship
National Institutes of Health Fellowships in the Biomedical Sciences
Paul Pearson Scholarship Fund
Planning and Related Professions Program
Poncelet Scholarships
Presidential Merit Fellowships
Public Administration Faculty-Alumni Scholarship
Public Policy Studies Fellowships
Jack B. Sacks Foundation, Inc., Scholarship
Thomas Bradford Sanders Fellowships
School of Engineering and Applied Science Graduate Fellowships
Schwoerer Graduate Scholarship

Scottish Rite Graduate Endowment Fellowships**ServiceMaster Fellowship****Dorothy M. and Maurice C. Shapiro Scholarships to the University of Oxford****Dorothy M. and Maurice C. Shapiro Traveling Fellowship****J.B. and Maurice C. Shapiro Fellowships in International Affairs****Vest Graduate Scholarship****Jack C. Voelpel Memorial Fund****Washington Gas and Light Scholarship****Ronald Barbour Weintraub Research Fellowships in Biological Sciences****Ruth Ann Parker Wells Scholarship****Wolcott Foundation Scholarships****Helen and Sergius Yakobson Graduate Scholarship****Loan Funds**

Federal Stafford Loans—George Washington University is an eligible participant in the Federal Stafford Loan Program. These loans are made by lenders, including banks, credit unions, and savings and loan associations. Graduate students enrolled at least half time may apply for Subsidized Stafford Loan funds up to \$8,500 per year, based on their need as determined by a federally mandated formula based on the Free Application for Federal Student Aid (FAFSA). Stafford loans are variable-interest-rate loans, currently capped at 8.25%, with a repayment period up to 10 years; the government pays the interest while students are enrolled in school at least half time and for six months afterward. All graduate students may apply for an Unsubsidized Stafford Loan up to \$18,500, less any subsidized amount received. Terms and conditions are the same, except that the student borrower is responsible for all interest that accrues on the unsubsidized amount during the in-school period; deferments are available. Graduate students must apply for, and be eligible for, a full Subsidized Stafford Loan before their eligibility for a Federal Perkins Loan or Federal Work-Study will be determined.

Students must file the FAFSA and designate GW to receive their information. In addition, students must submit the Loan Questionnaire for the current year and a completed Stafford Loan application. Tax information for the current tax year (for example, 2001 for the 2002–2003 academic year) is required only for those selected for federal verification and for those who submit a Special Condition Form. Students who intend to use loan proceeds for payment of University charges at the time of registration should submit a loan application and all supporting documents to the Office of Student Financial Assistance by May 1 for the fall semester, October 1 for the spring semester, and March 1 for the summer sessions.

Note that federal statute requires multiple disbursements of Stafford loans. Recipients of one-semester-only federal loans, however, receive loan proceeds in a single disbursement. Students may not borrow against or take out an emergency loan on their next semester's loan disbursement until the first day of classes of that term.

The George Washington University Plan—In partnership with our preferred lenders, the GW Plan is a loan that offers attractive interest rates. Students should compare the Stafford with this program to determine which offers the best interest rate and payment options that fit the individual's budget. The plan allows you to obtain up to 100% of GW's annual graduate cost of attendance less any current financial assistance.

Other Loan Funds—The following loan funds are available to degree students. Complete information regarding each loan fund is available from the Office of Student Financial Assistance, Fiscal Section.

American Medical Association Nursing Home Administration Loan Fund
 George F. Henigan Loan Fund
 International Student Loan Fund
 Joanne Jacobs Student Loan Fund
 W. K. Kellogg Foundation Hospital Administration Loan Fund
 Jessie B. Martin Loan Fund
 Jack and Anne Morton Loan Fund
 Barney Plotnick, Student Loan Fund
 Hiram Miller Stout Memorial Loan Fund
 University Student Emergency Loan Fund
 Edmund W. Dreyfuss Loan Fund
 Peter and Doris Firsh Loan Fund

In addition, the Inner-City Special Student Assistance Loan Fund is available through the GW Multicultural Student Services Center.

Further information regarding need-based aid is available through the GW Office of Student Financial Assistance.

Student Employment

The University participates in the Federal Work-Study Program. Inquiries should be addressed to the Office of Fellowships and Graduate Student Support. In addition, the Career Center maintains a registry of both full-time and part-time positions available in the Washington area for undergraduate and graduate students. After registration, students may apply at the Center for interviews and referrals to positions for which they are qualified.

International Students

Limited awards for graduate teaching assistantships and University fellowships are the responsibility of the chairman of the department or dean of the school in which the degree is to be earned.

International students applying for graduate teaching assistantships must have minimum scores of 600 on the paper-based or 250 on the computer-based Test of English as a Foreign Language. International students applying from outside the University may be appointed to graduate teaching assistantships but must successfully complete an orientation and evaluation program held prior to registration. Those found to have difficulties with English will be required to enroll in specified courses in English as a Foreign Language and/or will be referred to the Speech and Hearing Center's speech enhancement program; such students will be assigned nonteaching duties in place of classroom instruction. Such students will be reevaluated each semester; if they are not designated as qualified to give classroom instruction by the end of one academic year, the teaching assistantship will not be renewed.

Graduate students who are presently enrolled at GW and have been proposed as candidates for graduate teaching assistantships by their departments must pass the Test of English as a Foreign Language at the levels indicated above and will be required to complete successfully the English for International Students oral interview and the orientation and evaluation program before they will be considered for graduate teaching assistantships.

For further information on requirements for international teaching assistants, contact the coordinator of the Center for Excellence in Learning and Teaching.

Students who wish to study in the United States should have sufficient funds available to cover expenses for one full year before attempting to enter a college or university. The cost at this University for one academic year (September-May) was \$28,278 in 2001-02 for full-time students (9 credits per semester) and will be higher in 2002-2003; generally speaking, expenses for international students are about \$2,000 over the stated figure, which includes room and board, tuition,

books, clothes, and incidental expenses, but not travel, holiday, or medical expenses.

Veterans Benefits

The Veterans Benefits office assists students entitled to educational benefits as active-duty personnel, veterans, or as widows or children of deceased or totally disabled veterans with any problems that may arise concerning their benefits. This office also processes certification of enrollment and attendance to the Veterans Administration so that educational allowances will be paid.

When feasible, students entitled to benefits as active-duty personnel, veterans, or dependents of veterans should consult with the veterans counselor prior to submitting applications to the Veterans Administration. All such students should obtain the instruction sheet issued by the veterans counselor; it sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration and includes other information of general interest. Eligible students should be aware they must be admitted to a degree seeking program by the start of their third semester in order to continue receiving veterans benefits.

STUDENT SERVICES

Office of the Dean of Students

The Office of the Dean of Students provides counseling and information for students, administers the nonacademic student disciplinary system and student grievance procedures, administers medical withdrawals, and assists in nonacademic program development. Staff members are well informed on University policies and the various student services provided on campus, enabling them to provide referrals and answers to many questions concerning general student life. Personal letters of recommendation for students applying to graduate and professional schools can be obtained from this office.

Housing

Although the University does not provide residence hall space for graduate students, the Community Living and Learning Center refers graduate students to apartments as they become available in University-owned buildings in the campus area. With a Metro stop on-campus, GW is easily accessible via public transportation. An off-campus housing resource center can be reached at www.och.gwu.edu for listings, a mover's guide, neighborhood information, and on-line help.

Student Health Service

The Student Health Service is an outpatient clinic staffed by physicians, nurse practitioners, and physician assistants who can evaluate and treat most of students' medical problems. Visits should be arranged by appointment; urgent problems may be seen on a walk-in basis if necessary. Charges for visits, lab-work, and medication apply. Psychiatric evaluation and short-term therapy appointments and crisis intervention are available. Health education and outreach programs on a variety of topics are provided throughout the year.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. All fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. Students enrolled in off-campus programs and continuing education programs are not eligible. The bills incurred from all services rendered outside of the Student Health Service (for example, X-ray work, laboratory work, and office visits to private physicians) are the responsibility of the student. Additional information is available at <http://gwired.gwu.edu/shs>.

Health and Accident Insurance

The University recommends that all students be covered by health and accident insurance. For information on health insurance offered through the University, students should contact the Chickering Group at 800-213-0579.

Immunization Requirements

The District of Columbia Immunization Law requires that all students under the age of 26 have a record on file with the Student Health Service documenting a current tetanus/diphtheria booster (within 10 years prior to initial registration) and two doses of vaccine against measles, mumps, and rubella that were given after the first birthday. The Health Service recommends that students be immunized against hepatitis B and varicella and that residence hall students be immunized against meningitis. The Health Service can give any needed inoculations on a fee-for-service basis. Students who have not provided proof of necessary immunization by the end of the second week of classes may be removed from classes until such proof is given and will be encumbered by the Student Health Service and will not be able to register for the next semester until such proof is given.

University Counseling Center

University Counseling Center services help students resolve personal, social, career, and study problems that can interfere with their academic progress and success. Services include workshops and groups on topics such as time management, study skills, procrastination prevention, family and relationship issues, stress management, conflict management, and self-esteem/self-development; and clinical services, including crisis intervention and brief personal counseling. The Center offers consultation and training programs for student, faculty, and staff groups. Career counseling and referral services are available to GW students, faculty, staff, alumni, and individuals from the greater Washington community. The Center provides self-help pamphlets, books, and tapes through its personal development program. Further information about all services and links to other psychoeducational materials can be obtained by visiting the Center's website at <http://gwired.gwu.edu/counsel>.

Career Center

The Career Center promotes effective career planning, teaches job search strategies, and facilitates contacts between GW students, alumni, and prospective employers through its many services. Services include full- and part-time job listings; internship listings; career consulting; workshops (including job search strategies, letters and resumes, and effective interviewing); a career resource room; on-campus interviewing; resume referral; resume critiques; the work-study program; cooperative education; computer- and Internet-based job resources; and a credentials service that supports graduate/professional school applications. Additional information is available at <http://gwired.gwu.edu/career>.

International Services Office

The International Services Office provides services to GW's international students, scholars, faculty, and staff. The office provides advising on a variety of personal issues, including cultural adjustment, living conditions, academic concerns, and finances; provides immigration assistance and information on U.S. government requirements and regulations specific to the international community; conducts orientation programs to assist in living, studying, and working in the United States; and serves as a resource center for the University community on issues of cross-cultural understanding.

Disability Support Services

Disability Support Services provides and coordinates support services for students with a wide variety of disabilities, as well as those temporarily disabled by injury or illness. Accommodations are available through DSS to facilitate academic access for students with disabilities. Services provided without charge to the student may include orientation to campus, registration assistance, readers, interpreters, scribes, learning disabilities advising, adaptive materials and equipment, assistance with note taking, laboratory assistance, test accommodations, regular advising, and referrals. DSS does not provide content tutoring, although it is available on a fee basis from other campus resources. The University does not pay for personal attendant care. DSS is located on the 2nd floor of the Marvin Center and is open from 9 a.m. to 5 p.m. weekdays and at other times by appointment.

Student Activities Center

The Student Activities Center furthers the educational mission of the University by offering programs, services, and facilities that foster the social and cultural development and school spirit of members of the University community. Staff members assist individual students and campus organizations with event planning, program coordination, and participation in special projects.

Programs and activities include advisement of campus organizations, registration of student organizations, planning and coordination of major campus events, and oversight of Greek Affairs, Colonial Inauguration, the Presidential Administrative Fellows Program, band and cheerleading, and intramural and club sports. Additional information about the services offered by the Student Activities Center, and about the various student organizations and committees, can be obtained from the *Student Planner and Handbook*.

Program Board—The Program Board, composed chiefly of elected and appointed students, has the primary responsibility of allocating resources for student programming on campus. In addition, the Program Board provides funding for activities presented by various campus organizations and encourages student participation in program planning through involvement in committees on the arts, concerts, festivals, films, parties, political affairs, and public relations.

Student Government—The George Washington University Student Association is made up of all full-time and part-time undergraduate and graduate students who are registered for academic credit on campus. A body of elected and appointed individuals is responsible for representing the interests of students at the University. The Student Association provides various services for students, such as academic evaluations, test and syllabus files, and the Student Advocate Service.

Student involvement in the governance of the University is also possible through participation in various administrative and Faculty Senate committees, advisory councils of the schools and college, selected committees of the Board of Trustees, and specialized bodies, such as the Residence Hall Association, the

Joint Food Services Board, and the Marvin Center Governing Board. This involvement has helped develop policies and programs beneficial to students and to the University community as a whole.

Student Organizations—Students are encouraged to become involved with existing student organizations or to initiate their own. There are approximately 270 registered organizations on campus, covering a broad spectrum of interests, including academic, professional, international, cultural, political, service, sports, hobbies, recreational, religious, and meditative groups as well as social fraternities and sororities.

The Cloyd Heck Marvin Center

The Marvin Center is the GW campus community center. The Marvin Center offers programs, services, and facilities for students, faculty, staff, alumni, and University guests. The Center's wide range of facilities includes dining locations, a theatre, lounges, recreational facilities, study rooms, conference and meeting rooms, Information Center, Colonnade Gallery, travel agency, computer store, bookstore, and Student Organization Resource Center. The Marvin Center provides facilities for programs conducted by the University Program Board, by academic departments that include the performing arts, and by other University organizations.

The Marvin Center Governing Board is a representative body composed of students, faculty, staff, and alumni. The Board works closely with the Center's staff in the review and development of policies, guidelines, and procedures that direct the operation of the Center.

Religious Life

The University recognizes the contribution that religion makes to the life of its students and encourages them to participate in the religious organizations of their own choice. Several religious bodies sponsor various groups and form a link between the University and the religious community. The advisors of the religious organizations are available for counseling and together constitute the Board of Chaplains to enhance religious life on campus. Religious services and special observances are also provided for the University community as announced.

Major Program Events

Art Exhibits—The work of locally, nationally, and internationally known artists is shown in monthly exhibits in the Dimock Gallery in Lisner Auditorium and in the Colonnade art gallery of the Marvin Center. Student art exhibits are presented each semester.

Concert Series—The Department of Music presents a series of concerts featuring faculty, guest, and student artists throughout each year. Other concerts are held regularly on campus.

Dance—The Department of Theatre and Dance presents major dance concerts, informal studio performances, experimental events, television appearances, and lecture-demonstrations. Students may audition to participate and have the opportunity to choreograph, perform, and gain experience in the technical aspects of dance productions.

Glee Club, Jazz Band, and Orchestra—The University Singers, University Band, Jazz Band, and Orchestra are available to students as credit courses or as cocurricular activities; major performances are presented to the University community several times a year, including regular winter and spring concerts. Chamber groups and jazz combos are regularly available for participation by all students.

Program Board—The University Program Board, through its various committees and in cooperation with other campus groups, regularly sponsors films, lectures, concerts, social activities, and special events.

Theatre—The Department of Theatre and Dance produces four major plays and musicals during the year on the proscenium/thrust stage in the Dorothy Betts Marvin Theatre. Additional works, including original and experimental plays, are produced in a more intimate studio theatre. Students can participate in all aspects of theatre and may receive credit toward their B.A. or M.F.A. degrees for some of their production work.

Athletics, Recreation, and Intramurals

The Charles E. Smith Center offers many facilities for student use, including courts for basketball, volleyball, and badminton; a jogging track; a swimming pool; gymnastics and weight rooms; racquetball and squash courts; and a sauna and lockers. In addition, the Student Activities Center sponsors a broad program of intramural and recreational activities held in the Smith Center and designed to accommodate various levels of skill, experience, and interest.

The University is a member of the National Collegiate Athletic Association (NCAA), the Eastern College Athletic Conference (ECAC), and the Atlantic 10 Conference. Its intercollegiate varsity teams compete against major universities throughout the region and nation in such sports as basketball, baseball, soccer, tennis, golf, cross-country, crew, swimming and diving, water polo, volleyball, and gymnastics.

OTHER PROGRAMS AND SERVICES

The major sections that follow describe the graduate programs and courses offered by Columbian College of Arts and Sciences, the School of Business and Public Management, the Graduate School of Education and Human Development, the School of Engineering and Applied Science, and the Elliott School of International Affairs. This section briefly indicates some of the University's additional programs, services, and administrative units. See University Regulations for policies governing patent and copyright and the use of human subjects.

Research Centers and Institutes

The University seeks to ensure the close integration of research and teaching, including the employment of students in sponsored projects and the use of research facilities for instructional purposes.

- Aviation Institute (*D. Jenkins*)
- Biostatistics Center (*K. Billingslev*)
- Center for the Advanced Study of Human Paleobiology (*B. Wood*)
- Center for Curriculum, Standards, and Technology (*M. Futrell*)
- Center for Digestive Diseases (*B. Bouscarel*)
- Center for Economic Research (*A. Yezer*)
- Center for Education and Human Service in Acquired Brain Injury (*J. Ruoff*)
- Center for Educational Leadership and Transformation (*S. McDade*)
- Center for Equity and Excellence in Education (*C. Rivera*)
- Center for Excellence in Municipal Management (*H. Tillery*)
- Center for Health Services Research and Policy (*S. Rosenbaum*)
- Center for the History of Recent Science (*H. Judson*)
- Center for Infrastructure Safety and Reliability (*S. Sarkani*)
- Center for Injury Prevention and Control (*B. Jolly*)
- Center for Integrative Medicine (*J. Pan*)
- Center for Intelligent Systems Research (*A. Eskandarian*)

- Center for International Health (*J. Banta—Acting*)
 Center for International Science and Technology Policy (*N. Vonartas*)
 Center for Latin American Issues (*J. Ferrer, Jr.*)
 Center for Law Practice Strategy and Management (*S. Chitwood*)
 Center for Nuclear Studies (*W. Briscoe*)
 Center for Real Estate and Urban Analysis (*J. Glascock*)
 Center for Risk Science and Public Health (*J. Balbus*)
 Center for the Study of Combustion and the Environment (*H. Miller, C. Mavriplis*)
 Center for the Study of Globalization (*J. Forrer*)
 Center for the Study of Language and Education (*J. Gomez*)
 Center for the Study of Learning (*D. Schwandt*)
 Center for the Study of Public History and Public Culture (*T. Murphy, J. Horton*)
 Center for Survey Research (*L. Willnat*)
 Center on Sustainability and Regional Growth (*J. Weiss*)
 Center for Washington Area Studies (*J. Henig*)
 Cyberspace Policy Institute (*C.D. Martin*)
 Dean Dinwoodey Center for Intellectual Property Studies (*M. Adelman*)
 Documentary Center (*N. Seavey*)
 Environmental Law Advocacy Center (*J. Turley*)
 ERIC Clearinghouse on Higher Education (*W. Cummings—Acting*)
 European Union Research Center (*S. Rehman*)
 First Federal Congress Project (*C. Bickford*)
 Hamilton Fish Institute on School and Community Violence (*P. Kingery*)
 Institute for Applied Space Research (*H. Helgert, B. Edelson*)
 Institute for Biomedical Sciences (*S. Ladisch*)
 Institute for Communitarian Policy Studies (*A. Etzioni*)
 Institute for Computer Graphics (*J. Hahn*)
 Institute on Crime, Justice, and Corrections (*J. Austin, W. Chambliss*)
 Institute for Crisis, Disaster, and Risk Management (*J. Harrauld*)
 Institute for Education Policy Studies (*J. Gomez*)
 Institute for Ethnographic Research (*R. Grinker—Acting*)
 Institute for European, Russian, and Eurasian Studies (*J. Goldgeier*)
 Institute for Global Management and Research (*J. Forrer*)
 Institute for Knowledge Management (*M. Stankosky, W. Hala*)
 Institute for Magnetism Research (*E. Della Torre*)
 Institute for Materials Science (*D. Ramaker, C. Gilmore*)
 Institute for Medical Imaging and Image Analysis (*M. Loew, D. Goodenough*)
 Institute for MEMS and VLSI Technologies (*M. Zaghloul*)
 Institute for Peacebuilding and Development (*A. Gerson, N. Colletta*)
 Institute of Public Policy (*H. Wolman*)
 Institute for Reliability and Risk Analysis (*N. Singpurwalla*)
 Institute for Spirituality and Health (*C. Puchalski*)
 Institute for Urban Environmental Research (*D. McGrath*)
 International Institute of Tourism Studies (*D. Frechtling*)
 International Rule of Law Center (*S. Karamian*)
 Joint Institute for the Advancement of Flight Sciences (*T. Tong, J. Whitesides*)
 Lipid Research Clinic (*J. Hsia*)
 National Crash Analysis Center (*N. Bedewi, A. Eskandarian*)
 National Health Policy Forum (*J. Jones*)
 National Ports and Waterways Institute (*J. Harrauld*)
 Ronald Reagan Institute of Emergency Medicine (*R. Shesser*)
 Eleanor Roosevelt and Human Rights Project (*A. Black*)
 Sigur Center for Asian Studies (*B. Dickson*)
 Space Policy Institute (*J. Logsdon*)
 Transportation Research Institute (*N. Bedewi, A. Eskandarian*)
 Wertlieb Institute for Long-Term Care Management (*N. Persily*)

Office of University Students

The Office of University Students makes on-campus, credit-bearing courses available to those who are not currently degree candidates at this University. Such students, often employed in government or industry, may be taking courses to enhance their career potential or as a matter of personal interest. They may be candidates for higher degrees at other institutions, sent here for special work as part of a graduate program. They may be undergraduates matriculated elsewhere, taking courses for transfer to their own institution or preparing for graduate work.

The Office of University Students requires a minimum registration of 3 credit hours per semester or session, except in special circumstances as approved by the director. Medical and law courses are not available to nondegree students.

Entrance Requirements—The Office of University Students requires visiting, nondegree applicants to have appropriate academic preparation prior to enrollment. Prerequisites are specified in the departmental course descriptions in this Bulletin. Contact the specific department for further information regarding appropriate academic background for a particular course. In addition, the applicant who has previously attended this or another college or university must be in good standing at that institution. An applicant who has been suspended from any educational institution for poor scholarship will not be considered for admission for one calendar year after the effective date of the suspension. An applicant who has been denied undergraduate admission within this University will not be considered for admission as a nondegree student for the same semester for which the application was denied. Applications for admission through the Office of University Students for a fall or spring semester are necessary for high school students and for international students. International nondegree students should obtain the form from and return it to the Office of University Students. High school students should obtain the form from and return it to the Office of Admissions. There is no application fee. For information on registration, please refer to the *Schedule of Classes* or visit <http://www.gwu.edu/~ous>.

Tuition and Fees—For information regarding fall and spring semester tuition and fees, see *Fees and Financial Regulations* in this Bulletin. For information regarding summer tuition and fees, see the Summer Sessions Announcement, available by request, by contacting 202-994-6360 or sumprogs@gwu.edu. Information is also available through the GW Summer Sessions website: <http://www.summer.gwu.edu>.

Regulations—Prospective and registered students are urged to acquaint themselves with the regulations concerning attendance and withdrawal under University Regulations in this Bulletin.

The deadline for adding a course during the regular fall and spring semester is the end of the second week of classes. A course dropped during the first four weeks of classes will not appear on a student's transcript. A course dropped after the fourth week but before the end of the eighth week will be assigned the grade of W (Authorized Withdrawal). The deadline for dropping a course without academic penalty is the end of the eighth week of classes. The deadline for complete withdrawal from a student's entire program of courses without academic penalty is the end of the ninth week of classes.

If a grade of I (Incomplete) is assigned, the instructor normally sets a period (maximum of one year) within which the uncompleted work must be made up. An Incomplete that is not changed within one calendar year becomes a grade of IF on the student's record.

All adjustments to course schedules during a regular summer session must be made within the first seven days of the official start of classes.

Summer Sessions

Courses are offered during the summer by all degree-granting divisions of the University. Summer Sessions also offers special programs that are not available during the regular academic year. Courses are offered during both day and evening hours. Students who are enrolled at the University for the spring semester may register for the following Summer Sessions without special application. Those who wish degree status may seek admission from the appropriate school within the University. Those who do not wish to work toward a degree at the University may apply through the "Quick Entry" process described in the Summer Sessions Announcement. For a complete statement concerning summer term work, see the Summer Sessions Announcement available by request by contacting 202-994-6360 or sumprogs@gwu.edu. Information is also available through the GW Summer Sessions website: <http://www.summer.gwu.edu>.

Consortium of Universities of the Washington Metropolitan Area

The George Washington University is a member of the Consortium of Universities of the Washington Metropolitan Area. Eleven universities in the Washington area—American University, Catholic University of America, Gallaudet University, George Mason University, George Washington University, Georgetown University, Howard University, Marymount University, Southeastern University, the University of the District of Columbia, and the University of Maryland—are associated in a Consortium through which they coordinate the use of their respective facilities; Trinity College is an associate member of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings the particular courses that best meet their needs. This privilege is subject to regulations of the school in which the student is enrolled. Participation is limited to degree candidates. Law and medical students are excluded from participation, except for LL.M. candidates. See the *Schedule of Classes* for specific regulations and information concerning registration for Consortium courses.

Registration forms and instructions are available from the registrar of the institution in which the student is enrolled. Students register and pay tuition at their own institutions for all Consortium courses; course fees are payable to the visited institutions.

The University Libraries

The George Washington University is a member of the Association of Research Libraries. The library collections of the University are housed in the Melvin Gelman Library (the general library of the University), Jacob Burns Law Library, Paul Himmelfarb Health Sciences Library, and Eckles Memorial Library on the Mount Vernon campus.

These collections contain over 2 million volumes. University appropriations supplemented by endowments and gifts provide research materials in the social sciences, the humanities, the sciences, and business. Gifts from many sources have enriched the collections, including a large National Endowment for the Humanities grant to strengthen the University's humanities holdings. The libraries hold over 18,000 serials.

Information concerning the use of the libraries may be obtained from the GW Information System, Gelman home page, and at library service desks. Individual and class instruction in the use of the library and orientation to library facilities are given by librarians upon request as well as through print, media, and computer-assisted instruction. The libraries strive to fulfill the curricular and research needs and interests of the students. Through computerized searches of bibliographic databases, students identify and locate desired research materials not easily found through more traditional methods. The staff assists all members of the University in using the rich resources of the Washington area and the unusual opportunities they offer for extensive research.

Students, faculty, and staff at George Washington University (except law and medical students) may borrow directly from the main campus libraries of six other academic institutions in the Washington Research Library Consortium (WRLC). Students may also obtain books and journal articles on interlibrary loan from other libraries in the area and throughout the United States.

ALADIN is the electronic library resource of WRLC and contains the combined on-line catalog of the seven member universities with more than 4.3 million records, as well as a rich array of electronic databases, indexes, and full texts. ALADIN can be accessed from numerous computers in the libraries as well as remotely from on and off campus.

Information Technology Services

Information Technology (IT) Services provides technical assistance and training to users of technology within the GW community. Students, faculty, and staff are eligible to receive electronic mail accounts through IT Services. A variety of training options includes free seminars on commonly used systems, walk-in and over-the-phone assistance, and a virtual help desk.

Center for Academic Technologies

The Center for Academic Technologies supports all aspects of instruction, including assisting faculty in the development of new teaching approaches and materials and the operation of the University's many technology-enhanced classrooms and computer laboratories, which are available to all students for class projects and individual research.

GW Television

The primary television and multimedia resource of the University is GW Television, a state-of-the-art multichannel broadcast and production facility. GW Television develops courses and programs in cooperation with academic departments and outside clients for distribution on and off campus over various satellite and cable networks and in multimedia and web-based formats; produces videotapes and CD-ROMs for class use and for continuing professional education; offers national and international satellite videoconferencing and point-to-point interactive compressed video teleconferencing, and can deliver programming to many on-campus locations; manages compressed video links between remote campus locations; operates George Washington University Cable Television (CTV).

The Writing Center

In conjunction with the Department of English, the Writing Center provides writing instruction to GW students at all levels of experience and expertise. Students are assisted in identifying writing problems and learning how best to express ideas. Trained tutors (undergraduate peer tutors, graduate students, and the director and other members of the faculty) work with students individually on areas of specific need or interest. Tutors provide assistance in such areas as organizing a mass of information efficiently and clearly, using correct grammar and punctuation, getting started on a writing project, developing a thesis, providing evidence in support of an argument, and presenting the findings of an experiment or the solution to a research problem.

The Speech and Hearing Center

The Speech and Hearing Center provides diagnosis and treatment of a wide range of speech, language, and hearing disorders. These include developmental impairments of articulation and language, stuttering, voice disorders, and speech and language impairments resulting from neurological damage. Services

are available for persons wishing to modify a regional dialect or foreign accent. Evaluation and aural rehabilitation are also provided for hearing-impaired individuals. The Speech and Hearing Center operates in conjunction with the Department of Speech and Hearing.

Prizes

The following academic prizes are supported by permanently endowed funds established through the Office of the Vice President and Treasurer. The many other prizes and awards available to GW students are funded annually, rather than by permanent endowment, and are listed in the annual commencement program when information is provided in time for publication.

Elizabeth B. Adams Prize—Awarded annually by the Department of Management Science to a graduating student for outstanding performance in the field of information systems management. The recipient is selected on the basis of scholarship, leadership within the Department, contributions to the University, and service to the community.

Sylvia L. Bunting Prize—Awarded annually to a graduate student in the field of biology or zoology.

John Henry Cowles Prizes—Two prizes, established by John H. Cowles, Grand Commander of the Supreme Council of Thirty-third Degree (Mother Council of the World) of the Ancient and Accepted Scottish Rite of Freemasonry, Southern Jurisdiction of the United States of America. Awarded upon graduation to the graduate or undergraduate student with the best overall scholastic achievement and leadership potential in the School of Business and Public Management and in the Elliott School of International Affairs.

Ching-Yao Hsieh Prize—Two prizes awarded annually, one to an undergraduate and one to a graduate student in the Department of Economics.

Cecille R. Hunt Prize—Offered annually to deserving art students and every two or three years to participants in the University's Art Alumni Exhibition.

Elmer Louis Kayser Prize—Established by Paul and Elizabeth Rutheiser to be awarded annually by the Department of History for the best thesis in history submitted by a candidate for the degree of Master of Arts.

David Lloyd Kreeger Prizes in Art—Eight prizes given by Mr. Kreeger, six in the fine arts and two in art history (including museology). Fine arts prizes are awarded to a senior or graduate student in painting, sculpture, printmaking, ceramics, photography, and visual communication. One prize in art history is awarded to a senior and one to a graduate student. Candidates for the prizes must submit original papers or works of art. Winners are selected by distinguished representatives of the field of art in the Washington, D.C., area.

Minna Mirin Kullback Memorial Prize—Established in 1968 by Solomon Kullback in memory of his wife. Awarded annually by a committee of faculty members of the Department of Statistics to a full-time undergraduate or graduate student majoring in statistics, who will have completed 18 credit hours of statistics courses by the end of the spring semester.

Laurence Leite Prize—Awarded annually to a second-year M.A. candidate in art history.

Martin Mahler Prize in Materials Testing—Awarded to the upper-division or graduate student in engineering who submits the best reports on tests in the materials laboratory course, with preference given to prestressed concrete tests.

Nicole M. Paul Prize—Awarded annually to a first-year master's degree candidate in the Women's Studies Program.

Howard C. Sacks Prize—Awarded to a student in political science who has demonstrated outstanding academic achievement in the study of Far Eastern affairs.

Julian H. Singman Prizes—Two prizes awarded annually, one in design and one in aquarelle painting.

Alfred E. Steck Memorial Prize—Awarded for proven excellence in the field of sculpture.

Charles Clinton Swisher Historical Club Prize—Established in 1936 by the Charles Clinton Swisher Historical Club and augmented in 1941 by the bequest of Professor Swisher. Awarded annually to the student who submits the best essay covering some phase of medieval history.

James H. Taylor Graduate Mathematics Prize—Established in memory of James H. Taylor, former Professor of Mathematics at the University. Awarded annually to a graduate student for outstanding performance in mathematics.

Patricia M. Toel Memorial Prize—Awarded annually to a graduate student in photography to recognize outstanding achievement.

Benjamin D. Van Evera Memorial Prize—Awarded annually to that Graduate Teaching Fellow in Chemistry selected as the most effective teacher during the current academic year.

Thomas F. Walsh Prize—Established in 1901 and awarded annually to the student who submits the best essay in Irish history.

Alexander Wilbourn Weddell Prize—Established in 1923 by Virginia Chase Weddell in memory of her husband. Awarded annually to a degree candidate who writes the best essay on "the promotion of peace among the nations of the world." The prize essays shall become the property of the University and shall not be printed or published without the written consent of the University. The University reserves the right to withhold the award if no essay attaining the required degree of excellence is submitted.

W.T. Woodson Prize—Awarded annually to a graduate student demonstrating outstanding achievement in educational administration in the Graduate School of Education and Human Development.

GW Alumni Association

The objectives of this organization are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Membership in the Association is conveyed automatically to anyone who has been graduated from any school or division of the University. Anyone who has earned 15 credit hours or the equivalent at the University, who has left the University in good standing, and whose class has graduated is eligible for membership; in the case of the Office of University Students, however, only the "15 credit hours earned" requirement and not the "graduation of the class" requirement applies. Graduates of Center for Professional Development certificate programs are also eligible.

A Governing Board, composed of members representing the constituent alumni organizations, directs the activities of the Association. The voluntary leadership of the Association works closely with the staff of the Office of Alumni Relations in carrying out Association affairs. The Association may be contacted through the Office of Alumni Relations.

UNIVERSITY REGULATIONS

Students enrolled in the University are required to conform to the following regulations and to comply with the requirements and regulations of the school in which they are registered. Students who withdraw or are suspended, or who, for any other reason, are not registered at the University for one semester or more, may reapply and, if readmitted, continue their program only under the regulations and requirements in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission or any other University document, the student's registration may be canceled. If such falsification is discovered after the student has matriculated at the University, the student may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the faculty) for subsequent registration in the University.

Registration

Information on registration procedures is stated in the *Schedule of Classes*, which is available in advance of each semester.

Registration in courses is open only to those persons formally admitted to the University by the appropriate admitting office, as well as those students in good standing who are continuing in an approved program of study.

No registration is accepted for less than a semester or one summer session.

Students may not register concurrently in this University and another institution without the prior permission of the dean of the school in which they are registered in this University. With the exception of students enrolled in a joint degree program, registration in more than one school of the University requires the written permission of the deans concerned, prior to registration. Registration is not complete until all financial obligations have been met.

Eligibility for Registration—Registration for the following categories of on-campus students is held on the days of registration published in the *Schedule of Classes*. A student who is suspended or whose record is encumbered for any reason is not eligible to register. Registration in a given course may be denied nondegree students in the Office of University Students when space is needed for degree candidates.

New Student—Upon receipt of a letter of admission, the new student is eligible for registration on the stated days of registration.

Readmitted Student—A student previously registered in the University who was not registered during the preceding semester must apply for and be granted readmission by the appropriate admitting office before being eligible for registration.

Continuing Student—A student registered on campus in the immediately preceding semester or the summer session preceding the fall semester is eligible to register assuming good standing and enrollment in a continuing program.

Completion of Registration—Registration is not complete until financial obligations have been fulfilled. Students who do not complete their financial obligations in a timely manner may have their registration canceled and will not be permitted to attend class.

Registration for Consortium Courses—Degree students interested in taking courses at any of the other institutions in the Consortium of Universities of the Washington Metropolitan Area, Inc., should consult the program announcements of the other institutions. Consortium registration forms and instructions may be picked up in the Office of the Registrar. In order to participate in the Consortium program, students must obtain the approval of an advisor and

should ascertain from the department of the institution where the course is taught whether they are eligible for the course and whether there is space in the class. Specific inquiries should be addressed to the Registrar's Office. Detailed information concerning Consortium policy and procedures is printed in the *Schedule of Classes* and is available at the Registrar's Office website.

Adding and Dropping Courses

During the registration period (before the end of the second week of classes) students may add or drop courses using GWeb. After the second week of classes, students who wish to add or drop a course must complete a Registration Transaction Form and submit the form to the office of their dean; forms are available on line, at deans' offices, and in the Office of the Registrar. Adding a course after the second week requires a signature of the instructor or other authorized member of the department.

A course dropped during the first four weeks of classes will not appear on the student's transcript. A course dropped after the fourth week but before the end of the eighth week will be assigned a notation of W (Authorized Withdrawal).

The deadline for dropping a course without academic penalty is the end of the eighth week of classes in the fall and spring semesters. After the end of the eighth week of classes, dropping a course without academic penalty is only possible after the student presents a petition to the dean and receives written permission.

All charges for courses from which the student withdraws are subject to the refund policy listed under Fees and Financial Regulations in this Bulletin. Failure to withdraw by these procedures can result in an extended financial obligation and the recording of a grade of F (Failure) or a notation of Z (Unauthorized Withdrawal).

Changes in Program of Study

Changes Within a School—A student may not substitute one course for another within an established program of study or change status from credit to audit or from audit to credit without the approval of the dean of the school in which he or she is registered. Change from one major field to another within the same school may be made with the approval of the dean.

Transfer Within the University—Application for transfer to another school must be made to the appropriate admitting office on the form provided by the office concerned.

Grades

Grades are made available to students through the Office of the Registrar after the close of each semester. The following grading system is used: A, Excellent; B, Good; C, Minimum Pass; F, Fail; other grades that may be assigned are A⁻, B⁺, B⁻, C⁺, and C⁻. Symbols that may appear include CR, Credit; AU, Audit; I, Incomplete; IPG, In Progress; W, Authorized Withdrawal; Z, Unauthorized Withdrawal.

Except for courses that specifically state that repetition for credit is permitted, a candidate for a degree at this University may not repeat a course in which a grade of C or better was received, unless required to do so by the department concerned. A written statement to this effect must be submitted to the student's dean by the appropriate department chair.

The symbol of Z is assigned when students are registered for a course that they have not attended or have attended only briefly, and in which they have done no graded work. At the end of the academic year, students' records are reviewed; if there is more than one Z per semester, a student's record will be encumbered until released by the student's advisor or academic dean. The symbol of Z is not a grade but an administrative notation.

Incompletes—The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given the instructor for the student's inability to complete the required work of the course. At the option of the instructor, *I* may be recorded if a student, for reasons beyond the student's control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. *I* may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course that is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, that instructor may initiate an appropriate grade change.

When work for the course is completed and a grade change turned in to the Office of the Registrar, the grade earned will be indicated in the form of *I* followed by the grade. The indication of *I* cannot be removed from the transcript. For more information concerning changing a grade of Incomplete, consult the regulations of the school concerned.

The Grade-Point Average—Scholarship is computed in terms of the grade-point average, obtained by dividing the number of quality points by the number of credit hours for which the student has registered, both based on his or her record in this University. The grade-point average is computed as follows: *A*, 4.0; *A*−, 3.7; *B*+, 3.3; *B*, 3.0; *B*−, 2.7; *C*+, 2.3; *C*, 2.0; *C*−, 1.7; *F*, 0, for each credit hour for which the student has registered in a degree program. Although credit value for a course in which a grade of *F* is earned appears on the transcript for the purpose of calculating the grade-point average, no academic credit is awarded. In the case of a student who is allowed to repeat a course, the first grade received remains on the student's record and is included in the grade-point average. Courses marked *AU*, *CR*, *I*, *IPG*, *P*, *NP*, *W*, or *Z* are not considered in determining the average, except that courses marked *I* will be considered when a final grade is recorded. With the exception of Consortium courses, grades in courses taken at other institutions are not considered in computing the grade-point average.

Graduation Requirements

Degrees are conferred in January, May, and August. To be recommended by the faculty for graduation a student must have met the admission requirements of the school in which registered; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree as stated in this bulletin; filed an application for graduation by the published deadline date; and be free from all indebtedness to the University. Enrollment is required for the semester or summer at the close of which the degree is to be conferred, and all degree requirements must be completed by the last day of final examinations for that semester or summer session.

Participation in the Commencement Ceremony—Participation in the annual commencement ceremony held in May is open to students who have applied to graduate in the current spring semester or who graduated the preceding fall semester or summer session. With the exception of doctoral candidates, all students, graduate or undergraduate, who need no more than 9 credit hours to complete their degree requirements, may participate in May commencement ceremonies if there is a reasonable expectation that they will be able to obtain the needed credits during the following summer. The maximum of 9 credit hours is firm and not subject to petition.

Doctoral candidates who have not successfully defended their dissertation may not participate in either the May commencement or hooding ceremony. The commencement program does not include names and dissertation titles of doctoral candidates who have not successfully defended their dissertation by the end of March, although such students may attend the commencement and hood-

ing ceremony if they have completed all requirements by the end of the spring semester.

Students who apply after the published deadlines are not guaranteed commencement materials and may not be listed in the commencement program. Summer graduates who elect to attend the preceding May ceremony must apply for graduation no later than February 1.

Scholarship and Residence—Students must meet the scholarship and residence requirements for the degree for which they are registered.

Curriculum—Minimum curriculum requirements for each degree are stated under the school offering work in preparation for the degree. In cases where specific curricular information is not provided in this Bulletin, the program of study, as indicated by the program faculty, must be completed.

Thesis or Dissertation—A thesis or dissertation submitted in partial fulfillment of requirements for a degree must be presented in its final form by the deadline set by the school concerned. Accepted theses and dissertations, with accompanying drawings, become the property of the University and are deposited in the University's Gelman Library, where the duplicate copies are bound and made available for circulation. See the appropriate school in this Bulletin for regulations governing theses and dissertations.

Continuous Enrollment Status

Once entered in a degree program, a student is expected to be continuously enrolled and actively engaged in fulfilling the requirements for the degree each semester of the academic year until such time as the degree is conferred. A student is considered to be continuously enrolled when registered for courses or when engaged in and appropriately registered for activities such as the following, with the prior approval of the school in which the student is enrolled: cooperative work semester; study abroad program; attendance at another institution with prior approval to have work transferred back to the GW program; completion of outstanding work in courses in which a grade of Incomplete or In Progress was received (at the undergraduate level); or non-course instructional activities unique to the particular school. This status is generally limited to one year. Should the student break continuous enrollment at the University and not request and be granted a leave of absence (see below), he or she must apply for readmission and, if granted, be subject to the requirements and regulations then in force.

Leave of Absence

Should a degree student find it necessary to interrupt active pursuit of the degree, he or she may petition the dean for a leave of absence for a specific period of time, generally limited to one calendar year. A degree student who discontinues active enrollment in degree studies without being granted a leave of absence, or a student granted a leave who does not return to active study at the close of the period of approved absence, must apply for readmission and be subject to the regulations and requirements then in force. The right to use of University facilities is suspended while the leave is in effect.

Policy Regarding Students Called to Active Military Duty

Any student who is a member of a military reserve unit or the National Guard and is activated or called to active duty early in a semester or summer session automatically will be entitled to a full refund of all tuition and fees that he or she has paid toward the expenses of that academic term. If the notification of the call to active duty comes after the mid-term examinations or after other substantial graded work has been completed, the student will have the option of either taking a full refund of tuition and fees or taking an Incomplete in his or her courses

with the privilege of returning to complete all required coursework at some future date without payment of any further tuition and fee charges. It is the responsibility of the student to present evidence of his or her activation to the Office of Student Accounts and to request the appropriate refund.

Should a degree student called up for active duty find it necessary to interrupt active pursuit of the degree he or she may petition the dean for a leave of absence for a specified period of time, generally limited to one calendar year. Deans are encouraged to grant any request to extend the leave of absence for longer than the customary period should military service require an absence of more than one year.

All students on active duty will be automatically exempted from the request for a \$50 voluntary library contribution without requiring any communication from them or their initials on the bill.

Complete Withdrawal From the University

A degree-seeking student who wishes to withdraw from all courses during a given semester must complete a Complete Withdrawal Form and submit it to the Office of the Registrar. Forms are available on line, at deans' offices, and in the Office of the Registrar. The deadline for complete withdrawal from all courses without academic penalty is the end of the ninth week of classes. Complete withdrawal after the ninth week requires a petition to the dean.

All charges for courses from which the student withdraws are subject to the refund policy listed under Fees and Financial Regulations in this Bulletin. Failure to complete a Complete Withdrawal Form can result in an extended financial obligation and the recording of grades of *F* (Failure) or notations of *Z* (Unauthorized Withdrawal).

University Policies and Definitions

University Policy on Equal Opportunity—The George Washington University does not unlawfully discriminate against any person on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation. This policy covers all programs, services, policies, and procedures of the University, including admission to educational programs and employment. The University is also subject to the District of Columbia Human Rights Law.

Inquiries concerning the application of this policy and federal laws and regulations regarding discrimination in education or employment programs and activities may be addressed to Susan B. Kaplan, Associate Vice President for Human Resources, The George Washington University, Washington, D.C. 20052, (202)994-4433, or to the Assistant Secretary for Civil Rights of the U.S. Department of Education.

Academic Integrity—The University community, in order to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations. Members of the community will be presumed to be familiar with the proper academic procedures and held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper University channels. Copies of the University Code of Academic Integrity can be obtained from the following officers: all department chairs, all academic deans, the Registrar, and the Vice President for Academic Affairs.

Patent and Copyright Policies—Students who produce creative works or make scientific discoveries while employed or supported by the University or through substantial use of University resources are subject to the University's patent and copyright policies (see <http://www.gwu.edu/~research> under Intellectual Property).

Human Research Requirements—Students who are planning to conduct research involving the use of human subjects (for a thesis, dissertation, journal article, poster session, etc.) must obtain Institutional Review Board (IRB) approval before collecting any data. In order to receive this approval, contact the Office of Human Research, Ross Hall, Suite 712, 202-994-2715, to submit the study for the approval process.

The Library—All students registered in the University have the privilege of using the University's Gelman Library. Its stacks are open, and all students are welcome to browse. Authorized GW identification is needed to enter the library and to borrow books. Any book that circulates is subject to recall by the library if needed for reserve or requested by another user after a minimum of 20 days. Reserve books must be used in the library, except that they may be withdrawn for overnight use two hours before closing time. Transcripts of grades are withheld until a student's library record is clear, with all borrowed books returned and any fines paid. All students using the University's Gelman Library are expected to be familiar with its detailed regulations, available at any of the library's service desks.

Use of Correct English—A report regarding any student whose written or spoken English in any course is unsatisfactory may be sent by the instructor to the dean of the school, who may assign supplementary work, without academic credit, varying with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the dean.

Name of Record—A student's name of record includes the first name, middle initial or full middle name, and the family name. Nicknames may not be used. The University will change the name of a currently enrolled student on its official records but will require satisfactory evidence of a legal basis for the change. The diploma is awarded under the official name of record at the time of graduation.

Student Status—For the purpose of defining student status, graduate students taking 9 or more credit hours are considered to be full time, those taking 5 to 8 hours are considered to be half time, and all others are considered to be part time.

Attendance—Students may attend only those classes for which they are officially registered. Regular attendance is expected. Students may be dropped from any course for undue absence. A student suspended for any cause may not attend classes during the period of suspension. Students are held responsible for all of the work of the courses in which they are registered, and all absences must be excused by the instructor before provision is made to make up the work missed.

Credit—Credit is given only after completion of registration in a course and satisfactory completion of the required work, or upon the assignment of advanced standing in accordance with the regulations of the school concerned.

Auditing—A person who has been admitted to the University may be registered, with the permission of the instructor, as an auditor in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not repeat it later for credit. Tuition is charged at the prevailing rate.

Post-Admission Transfer Credit—Students who plan to attend another institution and apply credit so earned toward graduation from this University must first secure the written approval of their dean. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

Transcripts of Record—Official transcripts of student records are issued upon written request of the student or former student who has paid all charges, including any student loan installments, due the University at the time of the request. A nominal fee is charged for each official transcript. Unofficial copies of transcripts are mailed to students, by written request, at a nominal fee. Partial transcripts are not issued.

Student Conduct—All students, upon enrolling and while attending The George Washington University, are subject to the provisions of the *Guide to Student Rights and Responsibilities*, which outlines student freedoms and responsibilities of conduct, including the Code of Student Conduct, and other policies and regulations as adopted and promulgated by appropriate University authorities. Copies of these documents may be obtained from the Office of the Dean of Students or from the offices of the academic deans. Sanctions for violation of these regulations may include permanent expulsion from the University, which may make enrollment in another college or university difficult. Regulations or requirements applicable only to a particular program, facility, or class of students may not be published generally, but such regulations or requirements shall be published in a manner reasonably calculated to inform affected students.

Right to Dismiss Students—The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

Right to Change Rules and Programs—The University reserves the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine. The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

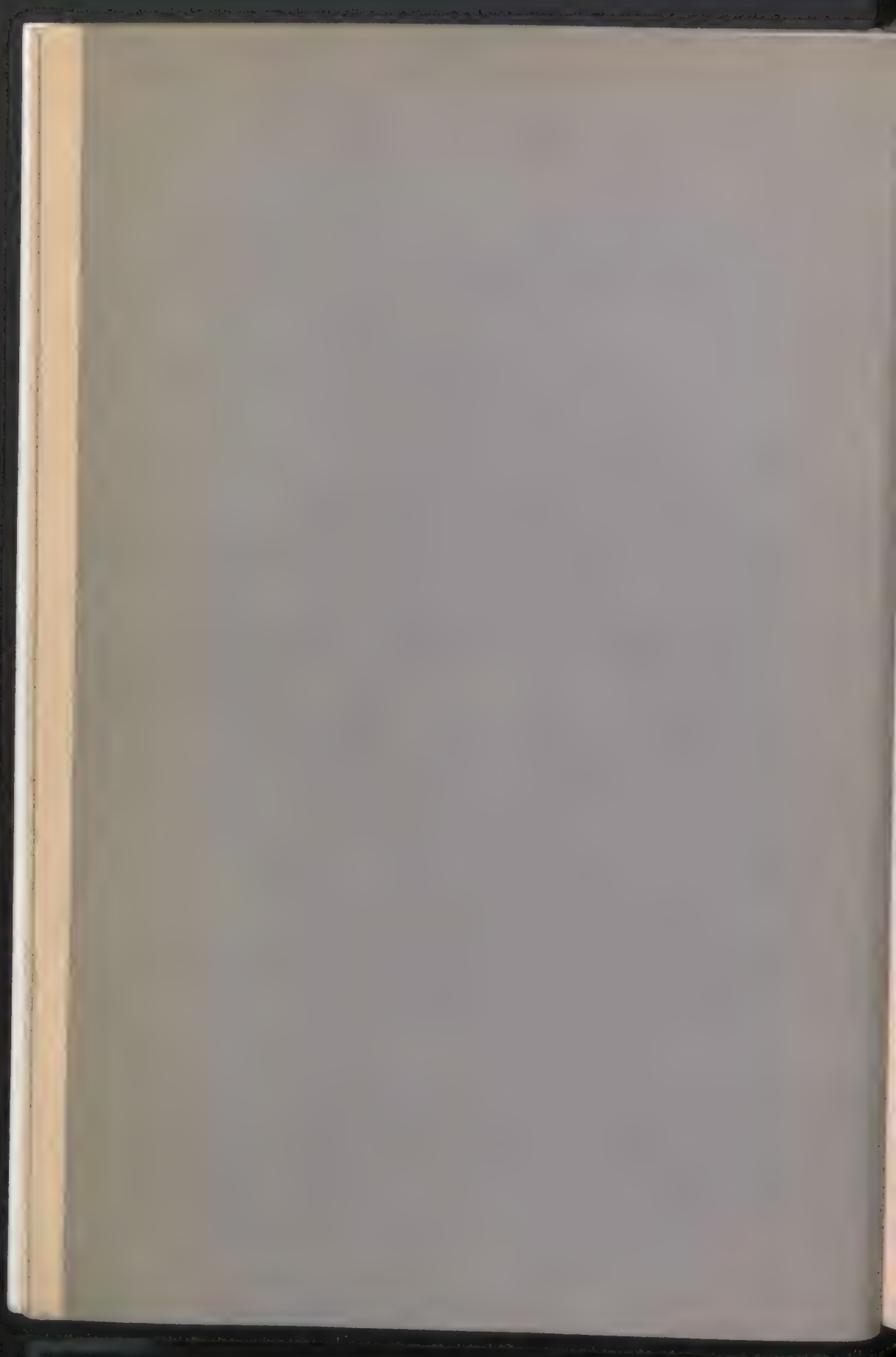
University Policy on the Release of Student Information—The Family Educational Rights and Privacy Act (FERPA) applies to institutional policies governing access to and release of student education records.

The University may release the following directory information upon request: name, local address including e-mail, and telephone number; name and address of emergency contact; dates of attendance; school of enrollment; field of study; enrollment status; credit hours earned; degrees earned; honors received; participation in University-recognized organizations and activities (including intercollegiate athletics); and height, weight, and age of members of athletic teams, as well as likenesses used in University publications. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

Copies of the University's full policy statement on the release of student information is published in the *Guide to Student Rights and Responsibilities*, available in the Office of the Dean of Students or the offices of the academic deans.

Property Responsibility—The University is not responsible for the loss of personal property. A Lost and Found Office is maintained on campus in the University Police Office.

The Schools



COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Interim Dean J. Folkerts

Executive Associate Dean E.A. Caress

Associate Deans F.C. Arterton, N.K. Khatcheressian,

K. Moreland, M. Moses, M.A.P. Saunders

The George Washington University awarded its first Doctor of Philosophy degree in 1888, one of the first institutions in the United States to do so. In 1892, the School of Graduate Studies was instituted. A number of organizational entities followed and, in 1965, after several decades of growth in a number of departments, the Graduate School of Arts and Sciences was established. All undergraduate and graduate education and research programs in the arts and sciences were combined in 1992 under one administration with the formation of the Columbian College and Graduate School of Arts and Sciences, now simply called Columbian College of Arts and Sciences.

All graduate programs in the arts and sciences, leading to the degrees of Master of Arts, Master of Fine Arts, Master of Forensic Sciences, Master of Public Policy, Master of Science, Master of Science in Forensic Science, Master of Philosophy, Doctor of Psychology, and Doctor of Philosophy, are administered by Columbian College. The faculty of Columbian College sets requirements for admission, provides courses and programs of advanced study and research, and establishes academic standards for its degrees.

Admission Requirements

Applicants must hold an undergraduate degree from an accredited institution of higher learning. Applicants should have academic backgrounds of excellence, usually with majors, or equivalent, in the fields in which they intend to study for advanced degrees. Normally, a *B* average (or equivalent) from an accredited college is required. With evidence of special promise, such as high Graduate Record Examination scores, an applicant whose academic record falls short of a *B* average may be accepted on a conditional basis. Meeting the minimum requirements does not assure automatic acceptance. The departments may, and often do, set higher admission standards. Moreover, the number of spaces available for new graduate students limits the number that can be accepted. Students who apply in their senior year must have completed their baccalaureate work before registration in Columbian College and must present evidence of such completion. Applicants should be aware that graduate courses taken prior to admission while in nondegree status are not used in assessing admissibility to degree programs.

With the exception of those applying to certificate programs and M.F.A. degree programs and those holding an earned J.D., M.D., or Ph.D., all applicants are required to submit scores on the GRE general test. In addition, some programs require scores on a GRE subject test (see the Columbian College section of the Graduate Admissions Application). The applicant must have the Educational Testing Service send the required score reports directly to Columbian College of Arts and Sciences. GRE scores are only valid for five years.

The following additional requirements pertain to all applicants from countries in which English is not an official language:

1. Applicants who do not hold a degree from a regionally accredited U.S. institution of higher learning are required to submit scores from the Test of English as a Foreign Language (TOEFL). The Test of Written English (TWE) is also recommended. The required minimum TOEFL score for admission to a graduate degree program is 550 (paper-based) or 213 (computer-based).
2. Applicants for graduate teaching assistantships must have a minimum score of 600 (paper-based) or 250 (computer-based) on the TOEFL.
3. Applicants admitted as degree candidates will be required to take the English as a Foreign Language (EFL) Placement Test at The George Washington

University before registering. Those who score 600 (paper-based) or 250 (computer-based) or more on the TOEFL are exempted. Depending on the applicant's performance on the placement test, EFL course work may be required.

Application for Admission—Full information is available in the Graduate Admissions Application or see www.gwu.edu/~gradinfo.

Readmission—A student who wishes to resume a graduate program that had been interrupted must file an application form and provide supporting documentation to be considered for readmission. Readmission is not guaranteed, and the application is subject to review by the department concerned and the dean. The student may be required to take additional course work and qualifying examinations on the course work completed. Application forms are available from the CCAS Graduate Office or see www.gwu.edu/~gradinfo.

CCAS Regulations

CCAS provides an on-line Graduate Student Handbook that contains additional updated information on the School's policies, regulations, and other matters of concern to enrolled or admitted students. It is the responsibility of the student to be aware of the information contained in both this Bulletin and the Handbook.

Grades

Information on grades and computing the grade-point average is found under University Regulations.

The grade of *I* (Incomplete) indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work for a course. Conditional students may not receive a grade of *I*. The Incomplete must be made up before the lapse of one calendar year. An Incomplete for regular course work that is not changed within one calendar year automatically becomes a grade of *IF* on the student's record. The grade of *I* cannot be removed by reregistering for the course here or by taking its equivalent elsewhere.

The grade of *IPG* is given for all thesis and dissertation research courses until the thesis or dissertation is completed. Upon the satisfactory completion of the thesis or dissertation, the grade *IPG* is automatically changed to *CR*. The grade of *CR* may be given for Advanced Reading and Research courses and independent research courses.

Scholarship Requirements

Graduate students are required to maintain a minimum cumulative grade-point average of 3.0 (*B*) in all course work taken following admission to a graduate program in the College. Individual departments may require a higher average; the Department of English requires a 3.25 grade-point average for master's candidates and a 3.5 average for doctoral candidates. Only graduate course work that is taken at the University or through the Consortium and that forms part of the student's departmentally approved program of studies may be included in the grade-point average.

In the case of a student who receives a grade of *F* for a course, the CCAS Graduate Office will require a written statement from the department justifying the student's continuance in the College and outlining the program to be followed. Continuation is contingent upon the dean's approval. When a grade of *F* is received for a course, the grade is included in the student's grade-point average whether or not the course is repeated.

A student may repeat a course in which a grade of *C* or above was received only when permitted to do so by the department concerned, unless the course description states that the course may be repeated for credit. A written statement of permission must be submitted for approval to the CCAS Graduate Office by the appropriate departmental advisor. If a course is repeated, the first

grade received remains on the student's record and is included in the student's grade-point average.

A graduate student may take an advanced undergraduate course (courses numbered 101–200) for graduate credit only upon the approval of the dean and the department at the time of registration. Such approval is granted only with the provision that the student complete additional work in order to receive graduate credit. No courses numbered 100 or below may be taken for graduate credit.

Program of Studies

The program of studies is a formal agreement between a student and a department of the requirements to be met in completing a specific degree program as well as the dates by which each requirement must be completed. Students should consult their department graduate advisor to outline their program of studies early in their program.

Students must make sure that they are fully informed of the requirements of Columbian College of Arts and Sciences as well as the requirements of their department or program. It is especially important for those admitted with conditions to consult with their departmental advisors as early as possible regarding completion of the additional requirements specified in the letter of admission.

Academic Work Load—Full-time students register for 9 to 12 credit hours each semester; part-time students must register for 6 credit hours each semester. These requirements do not apply to students who have fewer than 9 credit hours (full time) or 6 credit hours (part time) remaining to complete their programs. No more than 15 credit hours may be taken during any one semester. Students who are employed more than 20 hours per week are expected to apply for part-time academic programs, and they will not be permitted to register for more than 6 credit hours in any semester.

Continuing Research

All students must be continuously enrolled while working toward a degree, except during the summer sessions. (A few programs may require summer registration as well.) Students must complete all course work, special departmental requirements, thesis, and dissertation registration requirements and be within their program of studies deadline in order to register for Continuing Research (1 credit) each semester during the remaining semesters in their degree program. If continuous enrollment is not maintained, the student is dropped from the degree program unless a leave of absence is granted by the CCAS Graduate Office.

Leave of Absence

A student who, for personal reasons, is temporarily unable to continue the program of studies may request leave of absence for a specific period of time, not to exceed two semesters during the total period of degree candidacy. If the request is approved, the student must register for leave of absence each semester. If a student fails to register, degree candidacy is terminated.

Graduation Requirements

All students must file an Application for Graduation by the date indicated in the University Calendar for the semester or summer session in which they intend to graduate. Students must be registered in active status in the College during the semester or summer session in which they plan to graduate. Degrees are conferred in January, May, and August. Students who have completed the requirements for a degree but have not yet been awarded the degree will be issued a letter to this effect upon request. A commencement ceremony is held annually in May.

Degrees

Listed below are the graduate degree programs of Columbian College of Arts and Sciences and the specific degrees offered, by field. The programs are directed by the departments concerned. Degree programs that bridge two or more departments are directed by committees composed of members of the departments concerned. For further information write to the dean or the chair of the appropriate department.

Graduate Fields

The graduate course work offered in support of the degree programs in the following list is shown by department in this Bulletin.

Humanities	Degrees Offered	
American Studies	M.A.	Ph.D.
Art History	M.A.	
Classical Acting	M.F.A.	
English	M.A.	Ph.D.
Fine Arts	M.F.A.	
Ceramics, Design, Interior Design, Painting, Photography, Printmaking, Sculpture, Visual Communication		
Human Sciences		Ph.D.
Museum Studies	M.A.	
Theatre Design	M.F.A.	
Women's Studies	M.A.	
Social and Behavioral Sciences		
Anthropology	M.A.	
Art Therapy	M.A.	
Counseling*		Ph.D.
Criminal Justice	M.A.	
Computer Fraud Investigation		
Security Management		
Economics	M.A.	Ph.D.
Geography	M.A.	
History	M.A.	Ph.D.
Legislative Affairs	M.A.	
Media and Public Affairs	M.A.	
Organizational Sciences	M.A.	
Human Resource Management	M.A.	
Organizational Management	M.A.	
Political Management	M.A.	
Political Science	M.A.	
Professional Psychology	M.A.	Ph.D.
Psychology		Psy.D.
Public Policy		Ph.D.
Environmental and Resource Policy	M.P.P.	Ph.D.
Philosophy and Social Policy	M.A.	
Women's Studies	M.A.	
Sociology	M.A.	
Speech-Language Pathology	M.A.	
Telecommunication	M.A.	
Natural, Mathematical, and Biomedical Sciences		
Applied Mathematics	M.A., M.S.	
Biochemistry	M.S.	Ph.D.

* In cooperation with the Graduate School of Education and Human Development.

Biological Sciences	M.S.	Ph.D.
Biostatistics	M.S.	Ph.D.
Chemistry	M.S.	Ph.D.
Epidemiology	M.S.	Ph.D.
Forensic Sciences	M.F.S., M.S.F.S.	
Genetics	M.S.	Ph.D.
Genomics and Bioinformatics	M.S.	
Geoscience	M.S.	Ph.D.
Hominid Paleobiology	M.S.	Ph.D.
Immunology		Ph.D.
Mathematics	M.A.	Ph.D.
Molecular and Cellular Oncology		Ph.D.
Neuroscience		Ph.D.
Pharmacology		Ph.D.
Physics	M.A.	Ph.D.
Statistics	M.S.	Ph.D.

Requirements for the Degrees

The Master's Programs

Unless otherwise specified, the requirements listed below are applicable to candidates for all master's degrees offered by Columbian College of Arts and Sciences.

1. *General Requirements*—For a master's degree program including a thesis, the satisfactory completion of a minimum of 30 credit hours of approved graduate work, including 6 credit hours of thesis research, is required. For a master's degree program that does not include a thesis, the number of credit hours of approved graduate course work is determined by the department and normally consists of from 30 to 36 credit hours. The program without the thesis is not an individual student option and is not available in every department. Departments can and often do set requirements above the minimum required by Columbian College. Work taken to make up deficiencies is never counted as part of the requirements leading to a master's degree.

Upon approval, up to one-half of the required graduate work may be taken in courses offered by another degree-granting division of this University. With approval, up to one-quarter of work toward a master's degree may be taken in courses offered by the other affiliated institutions of the Consortium of Universities of the Washington Metropolitan Area. In all cases, at least one-half of the hours counting toward the master's degree must be taken after entering the program, in courses offered by Columbian College of Arts and Sciences.

All master's degree candidates must complete degree requirements within four years. If supported by the department, extensions beyond this may be obtained in exceptional circumstances by petitioning the dean.

2. *Transfer of Credit*—A maximum of one-quarter of the credit hours of graduate course work required for a degree may be approved for transfer to a graduate program in Columbian College from enrollment at GW in nondegree status or from another degree-granting school of this University or another accredited college or university. For a transfer of credit to be approved, *all* of the following conditions must be met: the course work must be from an accredited institution and must have been taken within the two years prior to admission to the College, it must be approved by the department as part of the student's program of studies, it must not have been applied to the completion of requirements for another degree, it must be post-baccalaureate graduate-level course work, and the student must have received a grade of *B* or better in each course for which a transfer of credit is requested. This action must be requested in writing and approved by the departmental advisor and the dean. A transcript of the course work must be on file before the request can be considered.

Once enrolled in Columbian College of Arts and Sciences, students are not permitted to transfer course work taken outside the University, except under extraordinary circumstances.

3. *Special Program Requirements*—Certain programs require their degree candidates to demonstrate a reading knowledge of an appropriate foreign language or languages, a competence in quantitative methods, or some other such special subject requirements. Courses taken at the undergraduate level to fulfill these requirements may not be counted in the number of graduate credit hours required for these programs. For further information on these and other regulations, consult the Graduate Student Handbook and the departments and programs concerned.

4. *The Thesis*—The main purposes of a master's thesis are to demonstrate the student's ability to make independent use of information and training and to furnish objective evidence of constructive powers in a chosen field. The student registers for 6 credit hours of thesis research. Registration for thesis research entitles the student to the advice and direction of the member of the faculty under whom the thesis is to be written. The thesis subject must be approved by the faculty member who will be directing the thesis. The thesis—in its final form, with one copy and a certificate of approval signed by the thesis director and by at least one departmental reader—must be presented to the dean no later than the date announced in the Graduate Student Handbook. All theses must meet the form, style, and other requirements set forth on line at www.gwu.edu/~ccas/thesis.html.

5. *Master's Comprehensive Examination*—Most programs require degree candidates to pass a Master's Comprehensive Examination in the major subject. Examinations are held on dates fixed by the departments. The nature and form of the examination are the responsibility of the department or program. A student who fails to pass the Master's Comprehensive Examination may, with the approval of the department, repeat the examination at the next scheduled examination date. If the student fails a second time, no further opportunity to take the examination is permitted, and the student's degree candidacy is terminated.

The Doctor of Philosophy Program

The Doctor of Philosophy program is divided into two parts: precandidacy and candidacy. During precandidacy, a student completes the general requirements and the General Examination. Upon satisfactory completion of the General Examination and any other requirements associated with precandidacy, the student is considered by the department or program and the dean for admission to candidacy. During candidacy, the dissertation is prepared and defended in the Final Examination.

The minimum requirements are as follows:

1. *General Requirements*—The programs leading to the degree of Doctor of Philosophy require the satisfactory completion of a minimum of 72 credit hours of approved graduate course work, including at least 12 and at most 24 hours of dissertation research. A minimum of 48 of these hours must be taken in the precandidacy stage, in preparation for the General Examination. A maximum of one-sixth of these hours may be taken in courses offered by the other affiliated members of the Consortium of Washington Area Universities. The exact number of credit hours required for any part of the total program is assigned by each department and may exceed the minimum required by the Columbian College.

Ph.D. students have an overall eight-year time limit for completion of all degree requirements. If supported by the department, extensions beyond this time period may be granted in exceptional circumstances by petitioning the dean.

2. *Transfer of Credit*—Entering students who hold a master's degree relevant to the proposed doctoral field of study may request transfer of up to 24 hours of

credit toward a doctoral degree for acceptable post-baccalaureate graduate work taken at the master's degree level at an accredited college or university. For those who do not hold the master's degree, a maximum of 24 hours of credit may be transferred, provided the conditions listed under The Master's Programs (Item 2) above are met.

3. *Special Program Requirements*—Certain programs require their degree candidates to demonstrate a reading knowledge of an appropriate foreign language or languages, a competence in quantitative methods, or some other such special subject requirements. Courses taken at the undergraduate level to fulfill special program requirements may not be counted in the number of graduate credit hours required for the student's doctoral program, except that up to 6 hours of course work at the 100 level may be so counted, with the approval of the department. For further information on these and other regulations, consult the Graduate Student Handbook and the departments and programs concerned.

4. *The General Examination*—The General Examination is composed of a written examination in each of the areas of study comprising the student's total program.

A student who fails to pass any part of the General Examination may, with the approval of the department, repeat the examination at the next scheduled examination date. If the student fails a second time, no further opportunity to take the examination is permitted, and the student's degree candidacy is terminated.

Satisfactory performance on the General Examination is required for admission to candidacy but does not guarantee it. A department will recommend advancement to candidacy only if satisfied with the student's performance in every aspect of the program, only after a dissertation advisor has been selected and a dissertation area determined, and only if the department is confident of the student's ability to complete the dissertation within the allotted time.

5. *The Degree of Master of Philosophy*—Upon departmental recommendation and approval of the dean, the degree of Master of Philosophy may be awarded to students who have successfully completed all requirements for the Doctor of Philosophy degree up to and including the General Examination. **Not all departments recommend students for this degree.**

6. *The Dissertation and Final Examination*—A dissertation is required of each doctoral candidate as evidence of ability to perform scholarly research and interpret its results. The student normally enrolls for 12 to 24 hours of dissertation research after admission to candidacy. Dissertation Research must be taken in units of no less than 3 credits per semester. If an extension beyond the eight-year limit is approved by the department and the dean, the student may be required to register for 6 credit hours of Reading and Research for the grade of Audit and to retake the General Examination.

When the dissertation has been approved by the director and the members of the Dissertation Research Committee, the candidate takes the Final Examination, an oral examination that is open to the public. A committee of examiners (composed of Columbian College faculty and outside scholars) conducts the examination. A sufficient number of copies (usually seven) of the dissertation must be provided by the candidate for the members of the Examination Committee. If the candidate passes, he or she is recommended to Columbian College for the degree of Doctor of Philosophy. The candidate must submit to the CCAS Graduate Office the original and one copy of the dissertation with its abstract and all required forms.

Detailed information regarding regulations for the form and reproduction of the dissertation is available on line at www.gwu.edu/~ccas/thesis.html. The successful candidate for the doctorate is required, before receiving the degree, to pay a fee that is applied toward the expense of binding the two copies of the dissertation and microfilm service.

Joint Doctor of Medicine/Doctor of Philosophy Program

A joint program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements that must be fulfilled for both degrees are identical to those currently and separately established in the School of Medicine and Health Sciences and Columbian College of Arts and Sciences.

A student working toward these degrees may apply a maximum of 24 credit hours of approved course work in the School of Medicine and Health Sciences toward the minimum of 48 hours of course work required to qualify for the **General or Cumulative Examination for doctoral candidacy**. This course work is normally taken during the semesters that alternate with the medical program and in the years following the award of the M.D. degree. The student's research for the dissertation may begin concurrently with the final 24 credit hours of graduate course work leading to the General or Cumulative Examination. The estimated time for the completion of this dual program is six years.

In order to enter the joint program, a prospective student must first apply for and gain admission both to Columbian College and to the School of Medicine and Health Sciences separately through established procedures. Upon admission to both schools, the student may then apply for affiliation with the joint program. Work toward the Doctor of Philosophy degree is performed under the jurisdiction of a departmental doctoral committee.

The Doctor of Psychology Program

1. *General Requirements*—The program leading to the degree of Doctor of Psychology requires the satisfactory completion of a minimum of 87 credit hours of approved graduate work. A maximum of 12 credit hours may be taken in courses offered by the other affiliated members of the Consortium of Universities. Doctor of Psychology degree candidates normally have an overall five-year time limit for completion of all requirements for the degree. If supported by the program, extensions beyond this time may be obtained in exceptional circumstances by petitioning the dean.

2. *Transfer of Credit*—Provisions are the same as those of the Doctor of Philosophy Program, above, except that up to 29 credits may be transferred into the program.

3. *The General Examination*—Each student is required to complete the General Examination no later than the beginning of the final semester of the program. A student who fails to pass any part of the General Examination may, in exceptional circumstances, and with the approval of the program, repeat the examination at the next scheduled examination date. If the student fails a second time, no further opportunity to take the examination is permitted, and the student's degree candidacy is terminated.

Further information on the requirements of the Doctor of Psychology degree appears under Professional Psychology in the Courses of Instruction.

Fellowships and Financial Aid

Many departments offer graduate teaching assistantships and University fellowships, and research assistantships are available in some departments. Students should check with their department concerning the availability of assistantships and fellowships. Graduate teaching assistants and University Fellows are appointed by the dean of the School, based on department recommendations. Other kinds of sponsored and University awards are also available. Awards are based on academic excellence, and only full-time graduate degree candidates in Columbian College are eligible to be considered. Doctoral candidates receive preference in the awarding of full graduate teaching assistantship/fellowship packages. Most appointments are made on a year-to-year basis and are not

automatically renewable. Doctoral candidates may be funded for a maximum of six years, M.A. and M.S. candidates for a maximum of two years, and M.F.A. candidates for a maximum of three years. No student will receive more than six years of University support altogether.

Students applying for admission who also wish to apply for a fellowship should submit a completed application for admission by February 1. Students currently enrolled in the College should also submit the fellowship application to their department or program by February 1 and should check with their departments concerning additional application requirements. Filing the fellowship application entitles the student to consideration for all awards available in the student's department.

International students applying for teaching assistantships should refer to Financial Aid, International Students, for regulations governing the appointment of international graduate teaching assistants.

Students who wish to apply for loans should indicate their intent to do so on the Graduate Admissions Application. Information concerning loans is contained in a booklet available from the University's Office of Student Financial Assistance; an overview of funding opportunities is available from the University's Office of Fellowships and Graduate Student Support and at <http://www.gwu.edu/~gradinfo>.

Cooperative Programs

The American Studies Program at The George Washington University has a cooperative arrangement with the American Studies Program of the Smithsonian Institution. Members of the staffs of the Smithsonian's American Studies Program, National Museum of American History, National Portrait Gallery, and National Museum of American Art offer seminars and tutorial instruction in fields that provide students with an unusual opportunity to develop new dimensions in the discipline of American civilization. This program of study is open to students working toward the degrees of Master of Arts and Doctor of Philosophy and is intended to prepare them for research, teaching, and museum-related careers.

In the Department of Fine Arts and Art History, students in the Master of Arts in the field of art history with a concentration in museum training may take internships in the Corcoran Gallery of Art, the Freer Gallery, the Hirshhorn Museum and Sculpture Garden, the Museum of African Art, the National Museum of American Art, the Phillips Collection, the Renwick Gallery, and the Textile Museum.

The Museum Studies Program has forged strong relationships with more than forty local museums, historical houses, and government agencies. Each student is required to undertake 6 credit hours of internships—the equivalent of 520 hours of museum work. Most students elect to divide this requirement into two internships to maximize their exposure to different institutions and projects.

The George Washington University, in cooperation with two other universities and the Folger Shakespeare Library, helped establish the Folger Institute for Renaissance and 18th-Century Studies as a cooperative venture in graduate studies in the humanities. Fifteen universities are now member institutions. Seminars (limited to 12 students each) are offered each semester under the direction of American and foreign scholars. The Folger Library forms the core of the Institute. All participants enrolled in the seminars are granted access to the collections of rare books, manuscripts, and reference materials of the Library. All registered students are eligible to apply for admission to one or more of the seminars, although priority in enrollment will be accorded graduate students working on dissertations and postdoctoral scholars from the sponsoring institutions. Further information, including a listing of seminar topics, is available at the Folger Shakespeare Library.

Graduate Certificate Programs

A number of CCAS departments and programs offer graduate certificates. Check with the department or program concerned (indicated here in italics when different from the name of the certificate).

Art Therapy

Museum Studies

Political Management

Women's Studies

Leadership Coaching—*Organizational Sciences*

Organizational Management—*Organizational Sciences*

Computer Fraud Investigation—*Forensic Sciences*

Security Management—*Forensic Sciences*

Survey Design and Data Analysis—*Statistics*

SCHOOL OF BUSINESS AND PUBLIC MANAGEMENT

Dean S. Phillips

Senior Associate Dean D.J. Lenn

Associate Deans J.W. Cook, D.R. Sheldon

Organized as the School of Government in 1928, the School of Business and Public Management has been responsible for over half a century for the professional development of individuals assuming leadership roles in society. The School comprises eight departments—Accountancy, Finance, International Business, Management Science, Marketing, Public Administration, Strategic Management and Public Policy, and Tourism and Hospitality Management. The use of a multidisciplinary approach in educational programming helps prepare both the generalist and specialist for professional careers in today's complex, organizational society.

Mission Statement—We believe that the creation and dissemination of knowledge is essential for effective management. Our mission is to serve current and future leaders, managers, and professionals in the global community by offering superior learning opportunities in business and public management; engaging in research and other scholarly activities to advance management theory and practice; and providing management and professional expertise to **business, government, and not-for-profit organizations.**

We are guided by our commitment to excellence in teaching and life-long learning; excellence in research and creation of new knowledge; meeting the distinctive needs of both part-time and full-time students; promotion of an entrepreneurial spirit; intellectual and professional development of faculty and staff; diversity in students, faculty, and staff; emphasis on the interaction of public-sector and private-sector organizations; and active engagement in the public discourse about the social and ethical responsibility of business.

As active and responsible citizens of our local community, the nation's capital, we acknowledge our reliance upon its wealth of resources and our commitment to help shape its future.

Academic Status

The School of Business and Public Management joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of AACSB International—The Association to Advance Collegiate Schools of Business, and the undergraduate and master's programs in business administration and accounting are accredited by the Association. The School is a member of the National Association of Schools of Public Affairs and Administration, and its Master of Public Administration degree program is accredited by the NASPAA Commission on Peer Review and Accreditation.

Independent Study Plan

A graduate student of demonstrated capacity, with a special interest in the subject matter of a course, may be permitted to undertake study under the personal direction of an instructor, in accordance with the rules of the appropriate department. Credit under this plan is limited to the specific credit hours normally allowed when a course is taken on a class basis. A petition outlining the student's specific study plan must be submitted to the student's degree program director prior to beginning any independent study. The student may petition to complete a maximum of two independent studies in two separate semesters.

Students from Other Schools Within the University

Degree candidates from other schools of the University cannot register for more than 12 hours of credit from the Master of Accountancy, Master of Science in Finance, or Master of Business Administration degree programs.

The Master's Degrees

Entrance Requirements

To be considered for admission, applicants must present a bachelor's degree from a regionally accredited college or university. Admission to master's programs is highly competitive. Previous academic history, performance on the applicable entrance examination, letters of reference, motivation and aptitude to do graduate-level work, and professional experience are all taken into consideration.

Applicants for admission to programs leading to the Master of Business Administration must submit scores on the Graduate Management Admission Test; applicants for admission to the Master of Accountancy, Master of Science in Finance, and Master of Tourism Administration degree programs must submit scores on the Graduate Management Admission Test or the Graduate Record Examination; applicants for admission to programs leading to the degree of **Master of Public Administration must submit scores on the Graduate Record Examination.** It is the responsibility of the applicant to make arrangements for the required test with the Educational Testing Service, Princeton, N.J. 08541. Correspondence concerning the Graduate Management Admission Test should be addressed to Box 966; concerning the Graduate Record Examination, to Box 955. **Test scores that are more than five years old are not accepted for admissions review.**

Additional Requirements for International Students—Students from countries where English is not an official language and non-native English speakers are required to take the Test of English as a Foreign Language (TOEFL). A minimum TOEFL score of 550 (paper-based) or 213 (computer-based) is required for consideration for admission for all degree programs with the following exceptions. The Full-time Master of Business Administration, the Professional Master of Business Administration, the Master of Science in Information Systems Technology, and the Master of Science in Project Management require a minimum TOEFL of 600 (paper-based) or 250 (computer-based) and the Test of Written English (TWE). In some instances, an interview will be required of applicants. All international students coming from countries where English is not an official language and non-native English speakers must take a placement test administered by the Department of English as a Foreign Language. **Only those students who score 600 (paper-based) or 250 (computer-based) or higher on the TOEFL will be exempted from this requirement.**

Depending on the test results, the study of English as a Foreign Language may be required. The student may be restricted in the number and type of courses that can be taken. Students assigned English as a Foreign Language (EFL) courses should anticipate additional related tuition expenses as well as a possible extended period of time required to complete their degree program.

Transfer Within the School—Currently enrolled students wishing to transfer from one graduate degree program to another within the School must complete a new application for admission through the appropriate degree program office. Applicants for transfer are subject to requirements in effect at the time of transfer. In addition, students must submit all required credentials no later than the established completion dates for the term for which the transfer is requested. Students must be in good academic standing (3.0 grade-point average) for transfer consideration.

Readmission

A student who withdraws, is suspended, or is otherwise absent without authorization from the University for one semester or more must make formal application for readmission to the director of the student's degree program and

resubmit all supporting credentials including transcripts from previous schools attended, including George Washington University, and entrance examination scores. If readmitted, the student is subject to the rules and regulations in force at the time of return. If the student has attended one or more regionally accredited colleges or universities during absence from the University, complete official transcripts must accompany the application for readmission.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of last registration at the University and has not since registered at another college or university.

General Requirements

All students must complete the prescribed minimum number of credit hours of graduate course work. A maximum of 6 credit hours of graduate course work may be approved for transfer to the School of Business and Public Management from enrollment at GW in nondegree status or from another degree-granting school of this University, or another regionally accredited college or university under the following conditions: The course work must be approved as part of the student's program of studies; it must not have been applied to the completion of requirements for another degree, it must be at the graduate level, it must have been taken within the two years prior to acceptance into the program, and the student must have received a grade of *B* or better. A transcript and description of the course work must be on file before the petition can be considered. Should advanced standing be granted, the credit will count but not the grade. Only grades earned in courses in the Department of Public Administration while in nondegree status will be used in calculating the cumulative grade-point average.

Master's degrees are awarded by vote of the Faculty on completion of the required course work and completion of an acceptable thesis (if one is elected) in the chosen degree or field of concentration.

Courses numbered 101-200 may be counted toward the master's degree only when registration for graduate credit has been approved by petition at the time of registration by the director of the student's degree program. Written approval from the course instructor is also required. No work counted toward a bachelor's degree may be counted toward a master's degree; however, a student who has completed the equivalent of a Master of Accountancy or Master of Business Administration core prerequisite course with a grade of *B* or better as part of the bachelor's degree program may request a waiver of that course at the master's level. A grade of *B* or better is required to waive remaining core prerequisite courses on the basis of equivalent graduate-level courses completed at GW or another AACSB accredited college or university prior to admission to the program. All courses presented for waiver consideration must have been taken within five years prior to the first semester of enrollment into the program. Students should contact their degree program director for specific waiver criteria and deadlines for requesting waivers.

A full-time student may register for a minimum of 9 to a maximum of 15 credit hours each semester and 6 credit hours each summer session. Excluding those enrolled in the Professional Master of Business Administration, a graduate student who is employed more than 20 hours a week may not take more than 9 credit hours each semester and 3 credit hours each summer session. All work for a master's degree must be completed in five years.

Students who expect to continue studies for a doctoral degree after receiving the master's degree should ask for assistance in planning their programs of study.

No credit is granted for work done in absentia or without formal instruction, except for hospital residency, supervised field experience, independent study, and the thesis, which may be completed in absentia with the permission of the department, designated faculty advisor, or committee concerned.

Scholarship Requirements

The University's general scholarship requirements, including information on grades and computing the grade-point average, appear under University Regulations in this Bulletin.

A minimum grade-point average of 3.0 (*B*) must be maintained and is required for award of a graduate degree. All graduate courses and undergraduate courses taken for graduate credit after matriculation as a degree candidate (except those audited or taken for the grade of *CR*) will be used in the calculation of the grade-point average.

Probation—A student whose grade-point average falls below 3.0 at any point after completing 9 credit hours will be placed on probation. This probation extends through the period in which the student next attempts up to 12 credit hours of work, including prescribed courses. A student's program may be restricted by the program director if deemed necessary. During this period, the student's performance will be monitored to determine suitability for continued study. A student who fails to raise the cumulative grade-point average to 3.0 or better during the period of probation will be suspended. Incomplete grades are not allowed during the probation period and are grounds for automatic suspension. A student who is subject to probation for a second time at any point during the program is automatically suspended.

Grade of F—A master's degree candidate who receives a grade of *F* is required to present cause, for consideration by the director of the student's degree program, as to why continued study should be permitted. Once a grade of *F* is earned in a core, required, or elective course, it remains a part of the student's permanent record and is calculated into the grade-point average.

A master's degree candidate given the grade of *F* in a core or other required course, and permitted to continue in graduate studies, must repeat the course and achieve at least the grade of *B*. (Such a repeat does not expunge the grade of *F*, which remains part of the student's record.) Should this level of performance not be obtained, the student will be denied further registration as a degree candidate.

Suspension

A graduate student who does not meet the conditions of probation (see above) will be suspended. A student who is suspended or withdraws under these conditions may apply for readmission after the lapse of one semester. An outstanding Incomplete grade at the time of suspension must be completed or will turn to an administrative *F*. To be readmitted the student must submit evidence that indicates academic success if readmitted. A student so readmitted will continue on academic probation and must achieve a minimum grade-point average of 3.5 in the next 12 credit hours of graduate study. Should the student fail to achieve this minimum grade-point average, a second suspension will result and subsequent readmission will be denied.

Incompletes

Conditions under which the grade of *I* (Incomplete) may be assigned are described under University Regulations.

The grade of *I* must be changed by a date agreed on by the instructor and the student but no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An Incomplete that is not changed within this period automatically becomes an *IF*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the director of the student's degree program for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The

grade of I cannot be changed by reregistering for the course here or by taking its equivalent elsewhere, and remains on the student's permanent record even after the course has been successfully completed.

Thesis

Students contemplating doctoral study are strongly urged to include the thesis as an elective in their master's program. The thesis subject should be selected as early as possible to permit effective integration with the course work.

The subject must be approved by the professor in charge of the student's field. The thesis in its final form must have the approval of the professor in charge and must be presented to the dean by the student no later than the date announced in the calendar. Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the semesters in which registered for thesis seminar (299) and/or thesis research (300), to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time is granted. The student must, however, be enrolled continuously in the program. If the preparation of the thesis extends more than three semesters beyond the date registered for thesis research, the student must register for the entire required hours of thesis again and pay additional tuition.

Master of Accountancy

The Master of Accountancy is a flexible degree program that allows students to tailor their program of study to a specific career objective. Students choose from a wide range of courses and may focus their course work in controllership, financial statement analysis, or taxation.

The program consists of 30 to 37 credit hours, depending upon prior academic preparation and the number of courses that may be waived on the basis of approved prior course work or successfully passing a waiver examination. The first level is the Common Body of Knowledge and includes Accy 201/MBAd 210, Accy 202/MBAd 211, Econ 220, and MBAd 220 and 250. Econ 220 and MBAd 220 may be waived without substitution. The remaining Common Body of Knowledge courses may be waived with approved substitutions in the same field.

The remainder of the program consists of a choice of nine approved graduate-level SBPM courses (27 credits), with a minimum of five courses in accounting, taxation, or business law.

Students who intend to take the C.P.A. examination should be aware that the course work required for admission to the examination varies from state to state. Students are advised to consult the Board of Accountancy for the state in which they plan to take the examination and choose electives that meet that state's requirements.

Master of Business Administration

The Master of Business Administration is designed to prepare students for careers in management and leadership positions in both the private and public sector. Students acquire a comprehensive foundation in the fundamentals of business, the global environment in which they will function, and the analytical tools for sound decision making. Students may apply to the Full-time M.B.A. program, the Professional M.B.A. program (part-time), or the Executive M.B.A. program, depending on academic and professional background. Separate application procedures and criteria exist for all programs. International students who must maintain full-time status for student visa requirements may apply only to the Full-time M.B.A. program and should see minimum TOEFL requirements described under SBPM entrance requirements. Requirements for

both the Full-time and Professional M.B.A. programs are described immediately below. The Executive M.B.A. program, which is designed to meet the needs of middle- and senior-level executives and senior professionals, is described in detail under **Courses of Instruction, Virginia Campus**.

Full-time Master of Business Administration

The Full-time M.B.A. program is designed for individuals with a minimum of three years' work experience or those planning to take a career break to dedicate to a comprehensive one-and-one-half to two-year period of study. The program comprises 54 credits and additional required noncredit workshops in basic skills for managers. Students in the full-time M.B.A. develop expertise in a specific field of concentration or through an individualized field designed in consultation with a faculty member and approved by the director of the M.B.A. program. The student's concentration is complemented by a set of elective courses providing broad exposure to subjects and issues at the general management level or from other related program areas.

Waivers of up to 4 credits may be granted toward the completion of core requirements, reducing the program to the minimum residency of 50 credits. Waivers are specific by semester of study and are granted in consultation with the student's program coordinator.

The program consists of seven components.

1. *Basic Skills for Managers*—All Full-time M.B.A. students must satisfy the program's basic skills requirements in finite mathematics and calculus for managers through required workshop attendance and/or proficiency examination prior to the first semester of study.

2. *Core Courses (18 credits)*—Econ 220; MBAd 205, 210, 220, 230, 231, 240, 250, 260. All core courses are 2 credits and are completed as a cohort during the first year of study. Any two of these courses may be satisfied by evidence of successful completion of comparable work at other accredited institutions, or by proficiency examination. Core courses may not be taken to satisfy either field of concentration or elective requirements. Only one core course may be waived in each semester of the program's first year.

3. *Integrative Courses (4 credits)*—MBAd 211, 221. These courses are delivered as part of the first-year cohort experience, with the core. Each course is 2 credits. Integrative courses may not be taken to satisfy either field of concentration or elective requirements.

4. *GLOBE Program (2 credits)*—MBAd 201. The GLOBE (Global Leadership of Business Enterprise) requirement is a series of workshops in communications for managers and team building, seminars, and company visits integrated into the core curriculum and offered as part of the first-year cohort experience. Topics include business ethics, cross-cultural management, career development, total quality management, and site visits to companies and agencies in the Washington metropolitan area. MBAd 201 may not be waived.

5. *Capstone Course (3 credits)*—MBAd 270. Strategy Formulation and Implementation, is the culminating course that ties together the core curriculum; it includes the MBA intramural case competition and may not be waived. MBAd 270 must be taken in the first semester immediately following the completion of core and integrative course requirements.

6. *Concentration Courses (12 credits)*—These courses give students depth of understanding in a selected field. Courses are selected in consultation with faculty advisors and program coordinators and may be tailored to individual interests. The following 16 fields of concentration are available: accountancy; environmental policy and management; finance and investments; health services administration; human resources management; information systems management; international business; logistics, operations, and materials management; management decision making; management of science, technology,

and innovation; marketing; organizational behavior and development; real estate and urban development; small business/entrepreneurship; strategic management and public policy; tourism and hospitality management.

7. *Elective Courses (15 credits)*—Students may select any graduate-level courses to satisfy this requirement after consultation and approval of faculty advisors and program coordinators. Electives can include no more than one course in the student's selected field of concentration and must include one course with a global focus related to the field. Students are required to select an M.B.A. consulting practicum course or international internship/project experience course as one of their electives.

Professional Master of Business Administration

The Professional M.B.A. program is designed to provide the highest quality educational experience to part-time students who are currently holding full-time professional positions. The curriculum incorporates consistent emphasis on application of concepts and analytical tools to current management problems. There is a focus on teamwork and communication skills in team projects with an emphasis on real-world mix of private and public sector issues.

The program comprises 48 credits. Waivers without substitution may be granted for up to four core courses (8 credits), reducing the program to the minimum residency of 40 credits. Waivers may be allowed for an additional five core courses with substitution of second-level electives. All core courses are eligible for waiver consideration.

The program consists of three components:

1. *Core Courses (18 credits)*—Econ 220; MBAd 205, 210, 220, 230, 231, 240, 250, 260. All core courses are 2 credits. Core courses may not be taken to satisfy elective courses.

2. *Integrative Courses (6 credits)*—MBAd 211, 221, 271. All integrative courses are 2 credits. Integrative courses may not be taken to satisfy elective courses.

3. *Elective Courses (24 credits)*—Students may select any graduate-level courses to satisfy this requirement after consultation and approval of faculty advisors and program coordinators. While there are no fields of concentration for the Professional M.B.A., elective courses may be selected from fields of concentration in SBPM.

The program has two delivery options:

Accelerated cohort schedule—offered off-campus at GW's Professional Education Center in downtown Washington and at the Alexandria Graduate Education Center in Virginia. The accelerated cohort is designed for fully employed, mid-level managers with at least three years of professional experience who seek an intense graduate education while continuing to work full time. In addition to the general entrance requirements, a personal interview is required of candidates for the accelerated cohort. Waivers of core and integrative courses are limited to one per semester in the accelerated cohort.

The accelerated format includes one weekend residency prior to the first semester, followed by an intense schedule of core and integrative courses scheduled one evening per week and Saturday mornings, to be completed in three consecutive semesters as a cohort class; then students select their electives to complete the degree requirements in the next three semesters.

Flexible schedule—offered at GW's main campus. The flexible delivery option is designed for fully employed, mid-level managers with at least three years of experience who seek a flexible, self-paced graduate education while continuing to work full time. In addition to general entrance requirements, a personal interview is recommended. Accepted students may begin the program in the fall or spring semester and register for one or more courses each semester, as appropriate, to complete their degree requirements. Students have up to five years to complete their program on a self-paced schedule.

Master of Public Administration

The Master of Public Administration degree program prepares students for professional careers not only in the public service (federal, state, and local) but also in organizations that require a knowledge of public policy and administration, such as public interest groups and research institutes. The 40-credit-hour program, outlined below, is intended to provide both a generic core for all students and fields of concentration tailored to the interests and career objectives of each individual student. The curriculum is accredited and provides graduate instruction in all areas recommended by the Guidelines and Standards for Professional Master's Degree Programs issued by the National Association of Schools of Public Affairs and Administration.

All students are required to complete a 25-credit core (PAd 201, 202, 203, 204, 205, 206, 208, 209), which includes courses in public administration and management, public expenditure analysis, public policy analysis, applied statistics, and research methods; at the end of the program, a capstone seminar serves to integrate the diverse perspectives in public administration.

Each student selects, in addition, a 9-credit field of concentration. The five fields of concentration offered within the Department of Public Administration are budget and public finance; federal policy, politics, and management; managing in public organizations; managing state and local governments; policy analysis and evaluation. Three courses (9 credits) are required for each field. In addition to the fields listed here, students may elect such other standard three-course fields as strategic management and public policy, organizational behavior and development, information systems management, international business, health services administration, and management decision making. Moreover, with approval, a special field may be constructed, tailored to the student's academic interests and career objectives. To take a special field, the student writes a brief justification, specifying the courses to be taken, and submits it by petition through the faculty advisor.

The remainder of the program consists of two elective courses (6 credits) chosen by the student with the advisor's approval. The electives may be taken in any related program or discipline. Because public service requires a wide variety of expertise, students with all undergraduate degree backgrounds are considered for admission. There are no specific course prerequisites.

Master of Public Policy

The Master of Public Policy degree program is offered by Columbian College of Arts and Sciences and the School of Business and Public Management. See Public Policy under Courses of Instruction.

Master of Science in Finance

The Master of Science in Finance degree is designed to prepare students with specific career interests in the areas of financial management and research. The program of study leading to the Master of Science in Finance emphasizes the theoretical foundations of finance and quantitative methods in financial management. Students will be engaged in applied research and modeling using a variety of data sets and computer software packages. The curriculum provides in-depth study of the international and federal government regulatory dimensions of finance.

The Master of Science in Finance program consists of 48 credit hours of course work: Fina 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282. In addition, 6 credit hours each in calculus and economics and 3 credit hours each in financial accounting, managerial finance, and statistics are prerequisite.

The Master of Science in Finance is designed to be completed in either 12 months of full-time study including a summer session or 24 months of part-time study including two summer sessions. Students with very strong backgrounds in a particular subject area can petition to waive a required course to be replaced by an elective as approved by the program director.

Master of Science in Information Systems Technology

The Master of Science in Information Systems Technology is designed to provide students depth of understanding in a selected major field. The program offers four fields of concentration: information systems development, information systems project management, management information systems, and business technologies. Students have the option of combining two of these major fields within the program. In addition to the fields listed here, the Executive Master of Science in Information Systems Technology is offered on the Virginia Campus (see the Virginia Campus section under Courses of Instruction for more details).

Applicants with deficiencies in preparation may be required to take prescribed background courses, remedial workshops, or other forms of preparation before beginning course work in the program. Although scores are not required, applicants who have not previously demonstrated strong academic performance in a related field should submit GRE or GMAT examination scores as additional evidence of their capability to perform competitively at the graduate level.

The program consists of 30 to 33 credit hours of graduate course work.

Information systems development—Mgt 280, 282, 284, 287, four technical electives chosen from other M.S.I.S.T. courses, and two 3-credit general electives.

Information systems project management—Mgt 210, 215, 224, 230, 231, 280, 282, 284, 287, two technical electives chosen from other M.S.I.S.T. courses.

Management information systems—Mgt 201, 226, 231, 271, 280, 282, 284, 287; and two 3-credit electives chosen from Mgt 220, 224, 241, 272, 273, or other courses specified by the advisor.

Business technologies—Mgt 249, 279, 281, 282, 283, 284, 285, 287, and two approved Special Topics courses.

Master of Science in Project Management

The Master of Science in Project Management degree program is designed for professionals who want to enhance their ability to motivate people, integrate complex projects, and achieve cost-effective results. The curriculum focuses on traditional and modern techniques of managing projects in areas that range from new product development to mergers and acquisitions. The degree program is offered both on campus by distance learning.

The program consists of 36 credit hours of graduate course work. The required courses are Accy 201; Mgt 201, 202, 215, 224, 231, 267, 268, and two specified offerings of 290; the remainder of the program consists of SBPM electives approved by the advisor.

Master of Tourism Administration

The Master of Tourism Administration degree is an internationally oriented program focused on the professional and research aspects of the tourism and hospitality field. It places priority on preparation for career entry and mid-level management positions in public and non-profit organizations or commercial enterprises providing visitor services at local, state/provincial, regional, national, and international levels; integrated marketing of tourism destinations, products and services; or sponsorship or operation of events, such as conferences and

meetings, expositions, festivals, hallmark sport activities, and competitions. Students may also develop individualized study plans based upon clearly defined career requirements that utilize the resources of GW's International Institute for Tourism Studies, the University, and the Washington metropolitan area. Examples of individualized programs include hospitality management, ecotourism, aviation, and heritage tourism.

The program consists of 36 credit hours of course work consisting of four core courses (TStd 249, 250, 251, 270), courses in the field of concentration as outlined below, electives, and two capstone courses (either TStd 283 and 297 or TStd 299 and 300).

Destination management: TStd 260, 261, 262, 263.

Travel marketing: TStd 263, 264, 296; Mktg 246.

Event management: TStd 263, 277, 278, 296.

Sport management: TStd 264, 265, 277; Mgt 292.

Individualized studies: The student designs a plan of study and provides a brief justification specifying the courses to be taken, and submits it by petition through the faculty advisor.

Doctoral Program

The degree of Doctor of Philosophy is offered in accountancy, business administration, management and technology, and public administration. The Committee on Doctoral Studies supervises all aspects of the program.

Admission

The minimum admission requirement is a bachelor's degree from a regionally accredited college or university, preferably with a major appropriate to the proposed field of study. Most applicants have completed a master's degree in an appropriate field. Applicants whose degrees are in fields other than their proposed field of study are expected to obtain the necessary background either before or soon after admission to the program. Scores on the Graduate Record Examination or the Graduate Management Admission Test are required. Scores may not be more than five years old. Arrangements to take the tests must be made with the Educational Testing Service. Students whose native language is not English must also submit Test of English as a Foreign Language (TOEFL) scores of 600 or better (paper-based) or 250 or better (computer-based).

The Doctoral Committee does not use specific cutoff points for grade averages and test scores. It carefully reviews each applicant's entire record and makes its selection on a competitive basis in keeping with enrollment limitations.

Plan of Study

The doctoral program consists of two major parts: the pre-dissertation stage and the dissertation stage. The objective of the pre-dissertation stage is to provide the student with the theoretical foundations and practices of the primary and supporting fields of study and with a command of the relevant qualitative or quantitative methods of research and analysis. The objective of the dissertation stage is to have the student apply the obtained theoretical and practical knowledge and analytical methods to the resolution of a research problem. The research should be original and is expected to result in a contribution, either applied or theoretical, to the existing body of knowledge.

All course work, other educational activities, and required comprehensive evaluations in primary and supporting fields must be completed within five years of matriculation. The total program must be finished in seven years. If a student is granted an extension beyond the seventh year (14 semesters), the student must register and pay for 3 credit hours of Dissertation Research at the then-current tuition rate every semester until graduation.

The pre-dissertation stage is based on an individual study plan developed by the student under the guidance of the primary and supporting field advisors during the first academic year. In the study plan the student must state long-range professional objectives, all proposed academic activities, methods of evaluation, and a semester-by-semester schedule.

All students, regardless of the primary field of study, must include in their study plan Mgt 390, Philosophical Foundations of Administrative Research, and the multidisciplinary course 311, Seminar: Public-Private Sector Institutions and Relationships. These courses must be taken during the first academic year after admission. PAd 395, Research Methods, must be taken within the first two academic years. Mgt 391, Advanced Problems of Research Methodology, must be taken at the end of course work.

In addition to the evaluation methods proposed in the study plan, a comprehensive evaluation of study plan activities for both the primary and supporting fields is the final process of the pre-dissertation stage.

As background, a student whose field is designated as Business Administration must demonstrate, either through prior academic experience or through the proposed content of the doctoral study plan, a working knowledge of the principal content areas of business administration.

Supporting fields may be chosen from other departments of the University. A student selecting a field outside of the School, however, must meet the academic and administrative requirements of the department involved.

For more detailed information on the program and its administration, see the Handbook on the Doctoral Program, available in the Doctoral Program Office.

Special Programs

Executive Master of Business Administration

The Executive Master of Business Administration program, offered at the Virginia Campus near Dulles Airport, is specifically designed to meet the needs of mid- and senior-level managers and professionals without career interruption. See the Virginia Campus section under Courses of Instruction.

Executive Master of Science in Information Systems Technology

The Executive Master of Science in Information Systems Technology is a weekend-oriented program for participants representing a broad spectrum of public and private organizations. The program equips participants with the tools necessary to manage the diverse processes of the development and application of information technology to effectively meet the needs of the modern organization. See the Virginia Campus section under Courses of Instruction.

Joint Degree Programs

Students may work concurrently toward both the Juris Doctor degree in the Law School and the Master of Business Administration and Master of Public Administration, in the School of Business and Public Management. In consultation with their designated faculty advisor, students in these programs may transfer up to 14 credits of Law School course work to their SBPM program and 12 credits of SBPM course work to fulfill requirements for the Juris Doctor degree. Students must be admitted separately both to the Law School and to the School of Business and Public Management and must meet all requirements in each degree program prior to receiving either diploma. It is possible for a student to complete work for both degree programs within four years.

In addition, a joint degree program is available through the School of Business and Public Management and the Elliott School of International Affairs. The joint Master of Business Administration and Master of Arts is offered only to

students who plan to pursue a field of study in international business. The program consists of a minimum of 63 credit hours of course work. Students must be admitted separately both to the School of Business and Public Management and to the Elliott School of International Affairs and must meet all requirements for each program prior to receiving either diploma.

SBPM Post-Master's Graduate Certificate

The SBPM Post-Master's Graduate Certificate is designed to provide SBPM master's degree alumni an opportunity to build upon their previous graduate study to keep pace with today's business climate. Program participants may undertake a program of study in an existing SBPM field or from a series of specially designed program offerings. Further information is available from the Office of the Dean.

GRADUATE SCHOOL OF EDUCATION AND HUMAN DEVELOPMENT

Dean M.H. Futrell

Associate Deans J.C. Heddesheimer, R.N. Ianacone

The Graduate School of Education and Human Development prepares teachers, human resource leaders, counselors, and administrators for professional service. The School also offers opportunities to experienced professionals to extend and enrich their education. The programs are designed to meet the broad needs of persons who seek knowledge and skills necessary to provide effective learning and teaching, research, services, and leadership in a variety of settings that cover the entire life span.

The Graduate School of Education and Human Development is the administrative unit for three departments: Counseling/Human and Organizational Studies, Educational Leadership, and Teacher Preparation and Special Education. In addition to programs of study leading to its degrees, the School offers credit and noncredit workshops designed to meet the unique needs of metropolitan area school systems and other clientele in industry and government.

Special curricula are individually tailored for liberal arts graduates and graduates of other professional schools who are interested in teaching or in other human services areas. The School also offers a wide range of courses for teachers who wish to pursue advanced studies and additional endorsements and for provisional teachers who wish to prepare for teaching certificates.

Laboratory and clinical facilities are provided by the Community Counseling Service and Office of Laboratory Experiences, which is responsible for internship placements in the community. Field experiences are provided in cooperation with public and private schools, social and health agencies, museums, institutions in the business community, community and junior colleges, and the federal government. Some programs and courses are also offered at off-campus locations or via distance learning.

Mission Statement—The Graduate School of Education and Human Development at The George Washington University is committed to providing the highest quality of educational services to its students. We develop innovative research programs, contribute in diverse ways to local communities and the nation, and actively participate in the international community scholarship. Our location in the nation's capital, a vibrant multicultural and multinational center, offers a broad range of resources and opportunities to our diverse students and faculty. We believe that continuous self-examination and improvement are fundamental to the education and human development professions.

Bridging Concepts—The following bridging concepts are central to the unified conceptual framework of the School and weave through the mission, goals, and initiatives of its strategic plan.

Research and scholarship are prerequisite to the improvement of educational practice.

Leadership is critical in the reform and redesign of education and human service at all levels.

Building reflective practitioners through integration of theory and practice must be a focus of all programs.

A community of diverse learners is prerequisite to success in the education and human service professions.

Teacher Certification Preparation Programs

Programs are available to prepare students for teacher certification in elementary, secondary, and special education through the Master of Arts in Education and Human Development, Master of Education, and Education Specialist degree programs. Students who plan to prepare for certification must apply to the

appropriate degree program. These degree programs are also available to certified teachers seeking second endorsements.

In accordance with the 1998 Amendments to the Higher Education Act, Title II, Section 207, The George Washington University Graduate School of Education and Human Development provides required information in response to any request by potential applicants, guidance counselors, and prospective employers. An information sheet is included with all distributed materials and can also be viewed on the Web at www.gwu.edu/~gsehd.

GSEHD Regulations

Grades

Information on grades and computing the grade-point average is found under University Regulations.

The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. A grade of *I* remains on a student's record for one calendar year; if work for the course is not completed within the calendar year, the grade converts to *IF*. If the work is completed within the designated time period and a grade is assigned, the grade is indicated in the form of *I*, followed by the grade. The indication of *I* cannot be removed from the transcript.

Scholarship

A grade-point average of 3.0 is required for graduation. Students who receive a grade of *C* in more than 6 credit hours are subject to suspension. Students who receive a grade of *F* must confer with the dean before enrollment for further course work is allowed. More detailed information for doctoral students can be found in the Doctoral Student Handbook.

Continuous Enrollment and Maintaining Residence

Students must be continuously enrolled in GSEHD unless the dean grants a leave of absence. Failure to register each semester of the academic year will result in lapse of candidacy. Subsequent readmission is subject to whatever new conditions and regulations have been established by the School. See Continuous Enrollment Status under University Regulations.

When master's degree candidates are sitting for a comprehensive examination and are not otherwise enrolled in course work, they may prepare for and sit for the exam in continuous enrollment status. All doctoral students and those master's students who elect to take an additional semester to prepare for the examination or who must retake the examination are required to sign up for the examination preparation course, which carries a fee equivalent to 1 credit hour of tuition. See Master's Comprehensive Examination, below.

Leave of Absence

Students who, for personal reasons, are temporarily unable to continue their program of studies may request a leave of absence for a specific period of time not to exceed one calendar year during the total period of degree candidacy. If the request is approved, the student must register for leave of absence each semester. If a student fails to register, degree candidacy is terminated. After reaching the one calendar year limit, students who are requesting to register in leave of absence status for additional semesters must seek approval for further time in this status from the appropriate appeals committee.

PRAXIS Teacher Assessments

All degree programs preparing students for teacher certification require completion of the Educational Testing Service PRAXIS teacher assessments as

specified by the District of Columbia Public Schools, Educational Credentialing and Standards Branch.

International Students

In addition to all listed criteria for admissions, students from countries where English is not an official language are required to take the Test of English as a Foreign Language (TOEFL). A minimum TOEFL score of 550 (paper-based) or 213 (computer-based) is required for consideration for admission. All international students coming from countries where English is not an official language must take a placement test administered by the Department of English as a Foreign Language. Only those students who score 600 (paper-based) or 250 (computer-based) or higher on the TOEFL will be exempted from this requirement.

Depending on the test results, the student may be restricted in the number and type of courses that can be taken. Students assigned English as a Foreign Language (EFL) courses should anticipate additional related tuition expenses as well as a possible extended period of time required to complete their degree program.

The Degree of Master of Arts in Teaching in the Field of Museum Education

The Graduate School of Education and Human Development offers an intensive interdisciplinary program in museum education. The program is designed to prepare graduates for work fulfilling the educational mission of art, history, or science museums; zoos, aquaria, or nature centers; and historical societies or sites. Graduates also qualify to serve as liaisons between schools and museums and as professionals in museum-related private and public agencies.

Those interested in museum studies more generally should refer to Museum Studies under Courses of Instruction.

Admission Requirements

To be admitted to the program in museum education an applicant must have a bachelor's degree from an accredited institution; present a statement of purpose and two written references attesting to quality of academic record and work experience; submit scores on either the Graduate Record Examination or the Miller Analogies Test and transcripts from each institution attended; and be interviewed by the Selection Committee or make alternative arrangements specified by the Committee. A desire to broaden the museum audience and an interest in human development and learning are essential. Evidence of strong undergraduate, graduate, or professional experience in such fields as American studies, anthropology, art history, fine arts, history, or the biological, physical, or social sciences is desirable.

Plan of Study

All degree candidates take six sequential core courses in four successive semesters beginning in June and ending in July of the following year. Each student also pursues three elective courses in a chosen museum-related academic discipline, museology, or education. Two carefully supervised field placements provide direct museum education experience. In the fall semester, students serve two days a week as museum resource specialists in an educational site. In the spring semester, students hold four-day-a-week internships in a museum or museum-related organization. The program requires completion of 33 credit hours.

The Degree of Master of Education

Elementary Education—The Master of Education in the field of elementary education is designed for those with an undergraduate degree in the arts and sci-

ences. The 39-credit-hour program includes course work for students who wish to become eligible for licensure/certification for teaching at the elementary school level (grades 1-6); additional course work in content areas may be needed to meet specific jurisdictional requirements for licensure/certification.

Secondary Education—The Master of Education in the field of secondary education is designed for those with an undergraduate degree in the arts and sciences. Students are expected to have had substantial course work in an academic field taught in secondary schools. Degree candidates may specialize in art, educational technology, English, English as a second language, foreign languages, mathematics, science, or social studies. The minimum 36-credit-hour program includes the course work leading to eligibility for teacher licensure/certification; specific course work in the subject area to be taught may be needed to meet jurisdictional requirements for licensure/certification.

The Degree of Master of Arts in Education and Human Development

The degree programs leading to the Master of Arts in Education and Human Development are designed to provide students with specialized knowledge and skills required for advanced professional competence in a variety of educational, human development, and service industry careers. Each program of study involves a combination of classroom and field-based learning experiences tailored to a professional specialty and individual student needs. Students engage in a wide range of teaching and research approaches that reflect the School's commitment to excellence in professional education.

The diversity of master's programs in the Graduate School of Education and Human Development reflects its belief that education and human development comprise a multifaceted enterprise reaching persons of all ages in a variety of settings. These programs develop professional knowledge, skills, and attitudes that will enable graduates to foster learning, growth, and development in individuals throughout society. Depending on the program specialty, students are prepared to pursue careers in schools, universities, community-based and human service organizations, cultural and leisure institutions, and business and government settings.

Master's programs are available in the fields listed on the following pages.

Counseling—The master's programs in counseling are designed to provide three specialty concentrations and one subspecialty concentration for entry-level positions in professional counseling. Program graduates are prepared to specialize in a specific field and to work in a variety of settings in which professional counseling is offered. All counseling concentrations require the equivalent of two full years of study and provide core learning experiences that combine professional and behavioral studies with supervised laboratory, practicum, and internship experiences. Some programs have specific prerequisites in addition to the general admissions requirements. The master's programs in school counseling and community counseling and the doctoral program in counseling are accredited by the Council for the Accreditation of Counseling and Related Educational Programs. The master's program in rehabilitation counseling is accredited by the Council on Rehabilitation Education.

Students who successfully complete a graduate program in counseling are eligible to apply for certification by the National Board of Certified Counselors. Students who successfully complete the graduate program in rehabilitation counseling are eligible to apply for certification by the Commission on Rehabilitation Counselor Certification. State licensure and certification are available in most states, and requirements vary by state.

The core course of studies for all program concentrations includes course work in the foundations of counseling, human behavior and development, professional ethics, mental health problems, testing and assessment, career devel-

opment, individual and group counseling, cross-cultural counseling, and research and statistics.

Community Counseling—This 48-credit-hour program prepares graduates to enter the counseling profession in a variety of human service settings, including welfare and other social service agencies, mental health centers, penal institutions, court systems, employment centers, allied health agencies, government service agencies, community college counseling centers, employee assistance programs, and private practice.

School Counseling—This 48-credit-hour program provides professional preparation for individuals to become certified as counselors in public and private schools. The program is designed to provide students with the requisite knowledge and skills to provide professional counseling, assessment, consultation, and guidance services in a school setting.

Rehabilitation Counseling—This 48-credit-hour program prepares rehabilitation counselors to help persons with emotional, mental, and physical disabilities to live independently or return to work. The rehabilitation counselor works jointly with the consumer of rehabilitation services to make vocational and independent living choices and plans. In an accelerated program, persons with an undergraduate degree in human services/rehabilitation services can complete this program with a minimum of 42 credit hours.

Employee Assistance Counseling—This subspecialty can be elected as part of either the community counseling or rehabilitation counseling programs. The subspecialty is designed to prepare graduates as professional counselors in employee assistance programs in business, industry, and government settings.

Curriculum and Instruction—This program prepares teachers and other educational personnel for increased responsibilities in the planning, implementation, research, and evaluation of curriculum and instruction.

A minimum 36-credit-hour program includes study in curriculum development, research and evaluation of instructional practice, teacher education, work with special populations, and school policy and leadership. A program specialization may include advanced study in elementary education, a content area of secondary education, special education, or bilingual special education. The National Board for Professional Teaching Standards core propositions are integrated throughout all areas of study. An internship is required.

Education Policy Studies—The program is designed for students who wish to develop skills in the technical, political, and managerial aspects of education policy. Emphasis is placed on developing both an understanding of the political and social environments affecting education policy and the competencies needed to develop policy options, analyze their potential, select the most promising, implement policies effectively and evaluate impacts. Internships are offered in a variety of federal, state, and local agencies.

The 36-credit-hour program includes 12 elective credits that can be used for courses, independent research, and internships in federal, state, or professional organizations.

Educational Leadership and Administration—This program prepares students for various school-based and central office leadership positions, for supervisory positions, and for increased responsibility in teaching. The program is designed to prepare graduates for advanced levels of professional responsibility in diverse school communities and to increase their technical, conceptual, political, and leadership skills. Emphasis is on leadership and management, change, communication, organizational learning, administrative and legal issues, human relations, human resource development, general supervisory principles and responsibilities, and supervision of instruction.

The 33-credit-hour program includes courses and field experiences designed to meet administrative certification requirements in the District of Columbia,

Maryland, Virginia, and some other states. Candidates must have three years of successful teaching experience.

Educational Technology Leadership—This program is designed for persons who are entering or advancing in positions associated with schools, higher education, alternative educational settings, or other human service occupations in which computers and related information delivery technologies are used. The program of studies provides students with opportunities to develop the knowledge, understanding, and skills necessary to provide leadership in the rapidly changing environment of technology in education.

The 36-hour program includes required course work in the theory and practice of educational technology, including the use of computers and other instructional technology systems, technological management systems, policy-making, research methods, and leadership. The pioneering program is delivered via interactive distance education to students around the world. Nine hours of the program are specialization electives, which can be chosen, with the advisor's consent, from other departments in the University.

Higher Education Administration—This program prepares students for administrative positions in institutions of higher education, associations, national and international government agencies, and business and industry related to education. The program is designed so that a student may select a concentration in general administration, student affairs administration, higher education policy, international higher education, college teaching and academic leadership, and higher education finance. The course of study is organized in five parts: (1) an introduction to the world of higher education (how U.S. higher education evolved, the breadth of the U.S. system of higher education, and the administrative and governance structure of U.S. colleges and universities); (2) research design and analysis; (3) the concentration (in-depth focus on a particular aspect of higher education and its administration); (4) application electives (including internships and practical); and (5) leadership integration. All concentrations require a 33-credit (with comprehensive examination) or 36-credit (without comprehensive examination) program.

Human Resource Development—This program is designed for persons entering or advancing in positions associated with learning in organizational settings in all sectors of society. Typical careers are in organizational development, internal and external consulting, and training and development. The program is interdisciplinary, and students are encouraged to tailor their programs to individual career needs and objectives.

The seven required courses in the 36-credit-hour program include foundations and issues of human resource development, adult learning, group dynamics, research methods, organizational diagnosis, and either strategic human resource development or assessing the impact of human resource development efforts. Fieldwork in cooperating Washington-area business, industry, government, and community organizations may be a part of the learning experience.

Individualized Program—This program provides the opportunity to develop an individualized curriculum that cuts across existing fields, both within the Graduate School of Education and Human Development and between the School and other schools and departments of the University and the Consortium. The program is designed to meet specific career and professional objectives of applicants who have unique needs. The flexible program structure can be tailored to prepare for new and emerging fields in education and human development.

This 36-credit-hour program is available within or across the three departments of the Graduate School of Education and Human Development. The program must contain a 12-credit-hour core curriculum consisting of courses in human development, social/historical/philosophical foundations in education,

and curriculum. The remaining 24 credit hours must correspond directly to the program objectives and bear a direct relationship to each of the areas identified above. A minimum of 6 credit hours of fieldwork, or the equivalent, must be a part of the program. All work toward the degree must be specified at the time the initial program is developed.

International Education—This program is designed for persons who are entering or advancing in positions associated with training, education, adult learning, and development activities in diverse settings that require international understanding. The program aims toward preparation of leaders to bring about improvements in developing education systems. Students acquire knowledge of other countries and cultures, using the education system as a means of interpreting and translating knowledge across cultures and analysis of the formal and nonformal school systems as they reflect history, culture, development, values, contemporary concerns, and future trends. In addition, students acquire tools, methods, and habits of analysis that enable them to play a variety of roles as leaders and change agents.

The program, which requires a minimum of 33 credit hours, allows a selection from a variety of subspecialization areas. A minimum of 15 credit hours is required in the international education studies area. A 9-credit-hour subspecialty complements the major area of study and may be taken in any division of the University. Six credit hours of internship may be required for students who do not have international education related experience.

Special Education—The master's programs in special education provide core and specialty studies and field experiences designed to prepare highly competent and committed professionals for a broad range of educational and leadership roles in the field of special education and related services.

Infant Special Education—This program is designed to prepare professionals to serve the needs of infants and toddlers with, or at risk for, disabilities and their families. The course of study prepares students to perform direct service and administrative, consultative, and research roles in health care, human services, and educational settings. Internships in specialization areas include hospital-based programs, infant intervention settings, developmental assessment clinics, research facilities, day-care centers, and advocacy organizations.

The 39-credit-hour program includes courses in infant development and assessment, neurodevelopmental assessment and programming, family systems intervention, behavior management, and law and policy. A practicum and internship are required.

Early Childhood Special Education—This program prepares educators in the areas of development of young children evidencing developmental delay, identification and assessment procedures, and clinical teaching and alternative models of service for children with, or at risk for, disabilities. The program prepares students for interdisciplinary work with children from ages three to eight.

The 39-credit-hour program includes courses in language development, typical and atypical development, formal assessment, interdisciplinary theory, family intervention skills, behavior management, and legal and policy concerns. A practicum and internship are required.

Special Education for Children with Emotional and Behavioral Disabilities—This 39-credit-hour program of study requires a two-semester clinical internship at an elementary and middle school serving children with serious emotional disturbance. Students are involved in course work and clinical experiences with professionals from various allied mental health fields. The program is designed to develop competencies in the nature and needs of children with serious emotional disturbance; assessment, programming, and teaching; and working effectively as an interdisciplinary and interagency team member. The program provides eligibility for licensure certification in the area of emotional disturbance; it is available to full-time students only and can be completed in one calendar year.

Special Education for Adolescents with Emotional and Behavioral Disabilities—

This part-time, 42-credit-hour program of study typically requires two academic years and three summers to complete. The program provides eligibility for licensure certification in the area of emotional disturbance; it is multidisciplinary in concept and design. Students are involved in course work and clinical experiences with professionals from various allied mental health fields. The program is designed to develop competencies in the nature and needs of adolescents with serious emotional disturbance; assessment, programming, and teaching; functioning effectively as an interdisciplinary team member; and providing consultation to administrators and teachers in regular education on inclusion.

Transition Special Education—This interdisciplinary program prepares educators and support personnel to address the needs of youth and young adults with special needs for careers and transition from school to postsecondary education, employment, and independent self-adjustment. Teacher licensure certification preparation in categorical learning disabilities or noncategorical special education is available through the program. The curriculum integrates the roles of relevant disciplines and service agencies, including postsecondary planning, alternative service models, and extended career support and adjustment to independent living. The program requires 39 credit hours of graduate course work, practicum, and field-based professional practice and research. Students can plan their programs to emphasize secondary and career programming, learning disabilities, collaborative vocational evaluation, traumatic brain injury, corrections, and business-education partnerships.

Admission Requirements for the Master of Education and Master of Arts in Education and Human Development

The Graduate School of Education and Human Development seeks applicants with strong academic potential, high motivation, and aptitude to do graduate-level work. Admission decisions are based on an evaluation of all material submitted in support of the application. The School requires official transcripts of all previous undergraduate and graduate course work and acceptable test scores on either the Graduate Record Examination or the Miller Analogies Test.

Two letters of recommendation and a statement of purpose are required. Most programs also require an interview with program faculty. The interview may be waived with permission of the lead faculty of the desired program for those living outside the Washington metropolitan area.

In addition to these basic requirements, individual programs may require relevant professional experience and other supporting documentation before a final decision on admission is made. Upon receipt of the application to the individual program, information on specific requirements will be sent to the applicant. The personal interview, professional experience, and supporting references provide important qualitative evidence concerning an applicant's academic potential and professional background.

The admission review is based upon a comparison of qualifications among all applicants, weighing both the School's general admissions criteria and program-specific criteria.

Positive decisions are made quickly for applicants who present uniformly strong application credentials in all areas. In some cases, unusually strong factors will offset comparatively weak factors and result in an offer of admission to provisional status in the School. For a student to be admitted to full candidacy from provisional status, he or she must earn grades of B- or better with a minimum cumulative grade-point average of 3.0 in the first 9 credit hours of course work. Grades of D are not acceptable.

Advanced Standing

Advanced standing is granted for approved courses taken at other accredited institutions, but a minimum of 24 credit hours must be completed in the Gradu-

ate School of Education and Human Development as a master's candidate. A maximum of 12 credit hours taken in nondegree status may be credited toward the master's degree.

Advanced standing is not granted for work completed five or more years before application for admission or readmission to master's candidacy. All work accepted for advanced standing must have been earned with a grade of *B* or better and must be approved for acceptance by both the advisor and the dean. *Credit*, *Satisfactory*, *Audit*, or other nonletter grades are not acceptable.

Plan of Study

The plan of study leading to the degree of Master of Arts in Education and Human Development requires a minimum of 33 hours of graduate credit. Several programs have additional credit hour requirements. The plan may, at the student's option, include a thesis carrying six hours of graduate credit. Whether or not a student selects the thesis option, a minimum of 18 hours must be from courses planned primarily for graduate students (third-group courses). A minimum of 12 hours, not including the thesis, must be from courses offered by the Graduate School of Education and Human Development.

Programs are initially reviewed in conference with an admissions advisor in the School and subsequently finalized with a designated advisor in the candidate's area of specialization. Programs are based on a candidate's interests and background; those related to teaching in public schools are designed around certification requirements of the state and locality in which the candidate plans to teach.

All degree requirements must be completed within six years, whether study is full time or part time. An additional (or seventh) year is allowed in the case of a student who breaks enrollment and is subsequently readmitted.

Thesis Option

Students may elect a thesis option. The choice of the thesis subject must be approved in writing by the student's advisor and filed in the office of the dean. A statement of the School's standards for the thesis and printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the office of the dean.

Payment of tuition for the thesis course entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted. The student must, however, be enrolled continuously in the program. If the preparation of the thesis extends beyond the additional time granted, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

Master's Comprehensive Examination

Candidates in master's programs requiring 33 credit hours must take a comprehensive examination. Candidates in some nonteaching programs whose basic requirements exceed 36 credit hours may waive the comprehensive examination with approval of the academic advisor. Candidates who plan to take the examination must file a written application in the Dean's Office of the Graduate School of Education and Human Development by the announced deadline. Comprehensive examinations are required of students in Educational Leadership and Administration, International Education, Education Technology Leadership, and all programs in the Department of Teacher Preparation and Special Education. See Continuous Enrollment and Maintaining Residence, above.

Second Master's Degree

Persons seeking a second master's degree in the Graduate School of Education and Human Development must complete all core and specialization requirements and a minimum residency requirement of 24 credit hours.

The Degree of Education Specialist

The program of advanced study leading to the degree of Education Specialist is for students with master's degrees in education who seek further professional preparation for specific objectives. The program is available in the fields of educational leadership and administration, counseling, curriculum and instruction, higher education administration, human resource development, and special education.

Admissions Requirements

The following are required for entrance to an Education Specialist program: a Master of Arts in Education and Human Development or its equivalent, two years of pertinent experience in an education or human development field, and a graduate scholastic average of at least 3.3 and an acceptable score on either the Graduate Record Examination or Miller Analogies Test. Two letters of recommendation, one from a professional supervisor and one from the most recent graduate faculty advisor, are required, along with a statement of professional goals. Each applicant must be interviewed and recommended by a faculty advisor in the major field.

Programs of Study and Degree Requirements

Individual programs are developed, through a plan of study worked out with a faculty advisor, to fit the candidate's skills, interests, and career goals. A minimum of 30 credit hours beyond the requirements of the degree of Master of Arts in Education and Human Development is required. At least 21 hours of this work must be taken in residence at GW. A maximum of five calendar years is allowed for completion of the program.

At least 12 of the required 30 hours must be in appropriate graduate courses in education selected from the following areas: (1) foundations and cognate study, (2) background and general principles of the field of study, and (3) an area of specialization. A graduate-level research methods course must be included in the program if it was not completed in previous graduate work.

The Comprehensive Examination

Successful completion of a six-hour written examination and/or an oral examination, at the option of the major field advisor, is required. Candidates taking the examination must be registered for at least 1 credit hour in the semester it is to be taken and must file a written application in the dean's office at least 30 days prior to the date of the examination.

The Degree of Doctor of Education

The Graduate School of Education and Human Development offers programs of advanced study leading to the degree of Doctor of Education. These programs provide major fields of study in curriculum and instruction, special education, educational administration and policy studies, human resource development, and higher education administration. Supporting fields are available in educational administration, higher education administration, counseling, curriculum and instruction, elementary education, human development, human resource development, international education, program evaluation, secondary education, special education, supervision, and teacher education. With the approval

of a student's program planning committee, course work may be taken in other departments of the University and through the Consortium. All programs require study of interrelated areas of education and a doctoral dissertation in the major field of study.

All doctoral programs are designed to accommodate the needs of working professionals who must pursue their studies on a part-time basis. Required graduate courses, with few exceptions, are offered in the late afternoon and evening. In some programs, selected courses may be taken at off-campus locations.

Admission Requirements

The applicant must have adequate preparation for advanced study, including graduate work in fields prerequisite to his or her objective and comparable to that required for the degree of Master of Arts in Education and Human Development at this University. Students with a master's degree in a field other than education may be considered for doctoral study provided that the degree and previous experience are judged relevant by the major field program faculty.

For an application to be considered by the major field program faculty, an applicant must have a minimum graduate scholastic average of 3.3 on a scale of 4.0 and an acceptable score on the Miller Analogies Test or Graduate Record Examination. Programs often set higher admission standards, and the number of new doctoral students in each program is limited.

The applicant is strongly encouraged to schedule an interview with the director of graduate admissions, who will discuss the applicant's needs in relation to the School's resources, explain the required procedures and standards, and guide the applicant through the admission process. In addition, all applicants must have an interview with faculty members in the major field. Students receiving favorable recommendations from the major field faculty are admitted to precandidacy for the degree.

Precandidacy and Candidacy

The Doctor of Education program is divided into two stages: precandidacy and candidacy. In general, the degree program requires two to three years of full-time study beyond the master's degree or the equivalent in part-time study. Course work and the comprehensive examination must be completed within five years, and the entire program must be completed within eight years. The minimum residency requirement in degree status for the Ed.D. is 36 credit hours of course work in the precandidacy stage and 12 to 24 credit hours of dissertation research in the candidacy stage. In most cases, course work beyond the minimum is required.

In the precandidacy stage, all course work in the program must be completed and the comprehensive examination passed. Course work toward the doctorate is established on the basis of a framework of seven domains: knowledge of foundations; critical literature review; research methods; clarity of thought, as expressed both in speech and in writing; professional development; technological skills; and depth of knowledge of the specialty area. A program plan of study is developed between the doctoral student and a doctoral study advising team, generally consisting of three members of the School faculty, one of whom is outside the student's program area.

The comprehensive examination is a two-day examination held each semester and taken upon completion of all course work (Pre-Dissertation Seminar may be excepted). Students taking the examination must be registered for at least 1 credit hour in the semester it is to be taken and must file a written application in the dean's office by the announced deadline.

The candidacy stage of doctoral study begins after successful completion of the comprehensive examination. A doctoral research dissertation committee is established and the candidate develops a dissertation proposal (this may be while registered in Pre-Dissertation Seminar). Upon successful completion of the comprehensive examination and the Dissertation Seminar, students must register for a minimum of 3 hours of Dissertation Research each fall and spring semester, until the satisfactory completion of the dissertation or the completion of 24 credit hours of dissertation research. Once they have reached their 24 credit hour maximum, they must register each subsequent fall and spring semester for 1 credit hour of Continuing Research until completion of their degree program with the successful defense of the dissertation to the Dissertation Oral Examination Committee and submission of two final edited copies of the dissertation and its abstract to the office of the dean.

Detailed information on the Ed.D. program and its administration is available in the Doctoral Student Handbook. Students completing their degree program should refer to the section on Graduation Requirements, Participation in the Commencement Ceremony, under University Regulations, as well as the fee for microfilm service and binding the dissertation under Fees and Financial Regulations in this Bulletin.

The Degree of Doctor of Philosophy in the Field of Counseling

A Ph.D. in the field of counseling is offered through Columbian College of Arts and Sciences in collaboration with the Graduate School of Education and Human Development.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Dean T.W. Tong

Associate Dean R.S. Heller

The School of Engineering and Applied Science was organized in 1884 as the Corcoran Scientific School of Columbian University. It was named in honor of William W. Corcoran, president of the University's Board of Trustees from 1869 to 1888. The school was among the first to accept women for degree candidacy in engineering. The organization and offerings of the school have evolved over the years, but throughout most of its history the program has been characterized by its emphasis on the principles guiding the advancement of technology. The current name was adopted in 1962.

Through its five departments—Civil and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Engineering Management and Systems Engineering; and Mechanical and Aerospace Engineering—the School of Engineering and Applied Science offers graduate study leading to the degrees of Master of Science, Master of Engineering Management, and Doctor of Science and to the professional degrees of Engineer and Applied Scientist. Programs are individually planned according to the student's preparation and needs. The School also offers graduate-level certificate programs through each of its five departments.

Among the special opportunities offered by the School are research institutes established to create opportunities for student and faculty research, strengthening ties with counterparts in government and industry, and contributing to the development and harnessing of emerging technology. These include the Institutes for Computer Graphics, MEMS and VLSI Technologies, Magnetics Research, Reliability and Risk Analysis, Materials Science, Medical Imaging and Image Analysis, and Crisis, Disaster, and Risk Management; Joint Institute for Advancement of Flight Sciences (located at the NASA-Langley Research Center in Hampton, Virginia); National Ports and Waterways Institute; National Crash Analysis Center; and Center for Infrastructure Safety and Reliability.

Degree Programs

The following list shows the eight fields of graduate study and representative areas of focus. Degree requirements are presented in subsequent pages. Within some fields, students may choose to focus their course work in other specialties as well. For information on professional and doctoral degrees in a given field, contact the department administering the field.

Civil and Environmental Engineering

Engineering Mechanics
Environmental Engineering
Geotechnical Engineering
Structural Engineering
Transportation Safety Engineering
Water Resources Engineering

Computer Engineering

Computer Architecture and Networking
Microelectronics and VLSI Systems
Multimedia Processing

Computer Science

Algorithms and Theory
Computer Architecture and Networks

Computer Security and Information Assurance
Database and Information Systems
Machine Intelligence and Cognitive Science
Multimedia, Animation, Graphics, and User Interface
Parallel and Distributed Processing
Software Engineering and Operating Systems

Electrical Engineering

Biomedical Engineering
Communications and Networks
Electromagnetics
Signal Processing, Systems, and Controls

Engineering Management

Crisis, Emergency, and Risk Management
Economics, Finance, and Cost Engineering
Engineering and Technology Management
Environmental and Energy Management
Knowledge Management
Management and Reliability of Infrastructure Systems
Software Engineering and Information Systems Management

Mechanical and Aerospace Engineering

Aerospace Engineering
Design of Mechanical Engineering Systems
Fluid Mechanics, Thermal Sciences, and Energy
Industrial Engineering
Solid Mechanics and Materials Science
Structures and Dynamics

Systems Engineering

General Systems Engineering
Operations Research and Management Science
Management and Reliability of Infrastructure Systems

Telecommunications and Computers (M.S. only)

Telecommunications Networks
Telecommunications Network Security

Admission Requirements

Entrance requirements are outlined under individual degree programs, below.

Transfer of Credit

With the approval of the student's advisor and department chair, graduate credit may be transferred, when applicable, to meet degree requirements of the School. For a master's or professional degree candidate, or a doctoral candidate whose highest earned degree is a master's, up to 6 credit hours may be transferred. For a doctoral candidate whose highest earned degree is a bachelor's degree, up to 24 credit hours may be transferred from another doctoral program. No more than 6 transferred credit hours can be applied to a master's or professional program. The credit must have been completed with grades of A or B at another accredited and recognized institution, at a level of study equivalent to that being pursued at GW. In addition, the professional and doctoral degree programs require that the credit be earned no more than five years prior to admission to the GW program, and some departments require that it be earned more recently. Credit applied toward a previous degree may not be transferred. Transfer of credit regulations apply to courses taken as a nondegree student through

GW's Office of University Students; that is, up to 6 credit hours may be taken in nondegree status before applying for admission to degree status. For purposes of transfer of credit, the SEAS graduate certificate program is not considered a prior degree; at the discretion of the department concerned, the credit hours earned in a SEAS certificate program may be applied to a subsequent master's degree program.

English Language Requirements for Admission of International Students

Applicants from countries where English is not an official language must take the Test of English as a Foreign Language (TOEFL). The University looks for a minimum TOEFL score of 550 (paper-based) or 213 (computer-based) in considering candidates for admission. Those admitted as degree candidates must take a placement test administered by the Department of English as a Foreign Language. Only those students who score 600 (paper-based) or 250 (computer-based) or higher on the TOEFL will be exempted from this requirement.

Depending on the test results, the student may be restricted in the number and type of courses that can be taken. Students assigned English as a Foreign Language (EFL) courses should anticipate additional related tuition expenses as well as possible extended periods of time required to complete their degree programs. Departments may set higher standards and should be consulted.

SEAS Regulations

Grades

Information on grades and computing the grade-point average is found under University Regulations.

At the option of the instructor, the grade of *I* (Incomplete) may be recorded if a student, for reasons beyond his or her control, is unable to complete the work of the course and if the instructor is informed of and approves such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course that is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented, the instructor may initiate an appropriate grade change. Although the grade of *I* may remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be made up. The grade of *I* cannot be removed by the student's reregistering for the course here or taking its equivalent elsewhere. An incomplete that is not removed within one calendar year or at the time of graduation of the student, whichever occurs first, is automatically changed to an *IF*. When the *I* is changed to a letter grade, the grade of *I* followed by the letter grade (e.g., *IB*) will appear on the student's record.

Credit/No Credit Grading System—SEAS students may take SEAS courses under the credit/no credit grading system, but credit for such courses cannot be applied toward any degree program in SEAS.

Program of Study

In consultation with the academic advisor, each student develops a program of study and enters it on a form that governs the student's degree requirements and that must be approved by the advisor and department chair. The form should be established soon after matriculation and must be completed before the student is certified for graduation.

Residence and Continuous Enrollment

All work for the degree must be done in residence unless an exception is granted by the department chair. A student in a degree program is expected to be con-

tinuously enrolled in the School until the degree is conferred. A student who breaks his or her registration must apply for readmission to the degree program under whatever conditions and regulations are in force at that time. To maintain continuous enrollment, a student may register in one of the following categories.

Leave of Absence—This status is available to students who are attending classes at another institution (special approval is required); who are temporarily transferred out of the area (e.g., for military TDY); or who are having temporary medical problems.

Continuing Research—Students who have completed their research credits, but are not yet ready to defend a thesis or dissertation, must register for 1 credit of Continuing Research each semester as appropriate.

Examination Preparation—Students who are studying for a comprehensive or qualifying exam for the current or following semester, and are not taking any courses, must register for 1 credit of Examination Preparation as appropriate.

Master's Degree Programs

Entrance Requirements

Admission to a master's degree program requires an appropriate bachelor's degree from a recognized institution and evidence of capacity for productive work in the field selected, such as may be indicated by undergraduate grades, GRE scores, and similar data. Although GRE scores are not generally required for admission to SEAS, applicants are encouraged to take the examination. In general, a grade average of *B* (3.0 on a scale of 4.0) in the last 60 hours of undergraduate course work is required. Department-specific requirements are indicated below.

Scholarship Requirements

Courses specified in the student's program of study must be completed with a minimum grade-point average of 3.0 for award of a master's degree. A student who receives two grades of *F* or three grades below *B-* is barred from further enrollment in graduate courses and, ordinarily, will not be readmitted as a degree candidate. A student may not repeat for credit a course in which he or she has received a grade of *C-* or above, unless required to do so by the department chair. A written statement requiring the student to repeat such a course for credit must be submitted to the registrar by the department chair.

Time Limits

A full-time student in the master's program is allowed a maximum of three calendar years (excluding the time spent taking only English as a Foreign Language courses) to complete all degree requirements, from the date of first registration as a degree candidate in prerequisite or graduate courses. A part-time student in the master's program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to degree candidate status or any period spent on approved leave of absence. Students who do not complete degree requirements within the allowed time will have their degree candidate status terminated. They may be readmitted to degree candidate status under conditions specified by the department chair and approved by the dean.

Master's Thesis

The master's thesis must demonstrate the student's ability to make independent use of the knowledge and discipline of thought acquired through graduate study, to undertake constructive work in a given field, and to communicate the results of the work in writing. Suitable work for which the student has

professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision.

To register for the thesis course (299), the candidate must submit the thesis area to the appropriate department chair, on the form obtained from the department office and approved by the faculty advisor. At the beginning of the semester of expected graduation, the candidate must submit the thesis title to the dean, on the form available in the department office. While registered in the thesis course sequence 299-300, the student is entitled to the advice of the faculty member under whom the thesis is to be written. Students may consult with their advisors, but they have primary responsibility for the thesis. Students orally defend their thesis before a committee of School faculty.

The thesis in final form must be submitted to the department chair by the date stated in the calendar for the semester in which the candidate enrolls in thesis course 300. In the event a thesis is unfinished on the date specified, the student must register for continuing research. The overall time limit for earning the degree (see Time Limits, above) may not be exceeded.

Copies of detailed regulations regarding the form and reproduction of the thesis are available in the department office. Accepted theses, with accompanying drawings, become the property of the University and are deposited in the Gelman Library, where the duplicate copies are bound and made available for circulation.

Fields of Study

Graduate programs in the School of Engineering and Applied Science are available in eight fields of study, indicated under the offering department, below. Each field in turn encompasses several areas of focus. The course of study responds to the unique interests of the student, who designs an individual program in close consultation with the assigned advisor. In most areas, students follow a prescribed core and elect approved courses from within the School of Engineering and Applied Science and from other schools of the University. Because engineering expertise includes a broad foundation in technology, engineering study may profitably be combined with study in other areas to sharpen the engineer's focus in practice.

Students must have satisfied, through undergraduate studies, the prerequisites specified, or approved equivalents.

Department of Civil and Environmental Engineering

The Department of Civil and Environmental Engineering administers the field of civil and environmental engineering. In addition to the entrance requirements stated above, the applicant is expected to have an undergraduate degree in engineering, the physical sciences, or applied mathematics. Minimum requirements for the degree are 33 hours of course work or 24 hours of course work and 6 hours of thesis.

Representative Areas of Focus Leading to the Master of Science

Engineering Mechanics—Required: ApSc 213; CE 220, 227.

Environmental Engineering—Required: CE 242, 250, 258.

Geotechnical Engineering—Required: CE 227, 231, 257.

Structural Engineering—Required: CE 205, 210, 227.

Transportation Safety Engineering—Required: CE 227, 260.

Water Resources Engineering—Required: CE 242, 250, 258.

Department of Computer Science

The Department of Computer Science administers the field of computer science. In addition to the entrance requirements stated above, students are expected to

be adequately prepared in the basic physical sciences and in mathematics (one year each of university laboratory science and of math beyond precalculus), and have taken a course in computer programming using a structured language and CSci 123, 131.

The program of study must have a minimum of 30 credit hours, of which at least 15 credits must be at the 200 level or above. CSci 210, 211, 212 are required. The following undergraduate courses may be taken for graduate credit if they are included in the student's approved program of study: CSci 173, 174, 180, 181, 185, 187, 188, 189, 190, and 194. Normally, no more than two courses may be taken outside of those offered by the department.

Graduate students are required to attend several department colloquia each semester. These are intended to broaden the student's professional outlook and to encourage interaction with the faculty. Schedules are posted.

Representative Areas of Focus Leading to the Master of Science

Algorithms and Theory

Computer Architecture and Networks

Computer Security and Information Assurance

Database and Information Systems

Machine Intelligence and Cognitive Science

Multimedia, Animation, Graphics, and User Interface

Parallel and Distributed Processing

Software Engineering and Operating Systems

Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering administers the fields of computer engineering, electrical engineering, and telecommunications and computers. In addition to the entrance requirements for the degree listed above, students are required to have a bachelor's degree in electrical engineering, computer engineering, or computer science and be adequately prepared in the basic physical sciences and in mathematics. Students with a bachelor's degree in another field and a basic knowledge of (a) mathematics and (b) electrical engineering, computer engineering, or computer science may be admitted, with a set of deficiency courses to be determined by the student's advisor.

The student is required to take three of the following seven courses: ECE 201, 203, 210, 211, 219, 225, and 248. The student chooses additional courses (five courses in the thesis option, or seven courses in the non-thesis option) based on individual interests, subject to the approval of the student's faculty advisor. A maximum of three courses at the 100 level may be counted toward the requirements for the degree.

Computer Engineering—Representative areas of focus leading to the Master of Science degree include computer architecture and networking, microelectronics and VLSI systems, and multimedia processing.

Electrical Engineering—Representative areas of focus leading to the Master of Science degree include biomedical engineering; communications and networks; electromagnetics; and signal processing, systems, and controls.

Telecommunications and Computers—Representative areas of focus leading to the Master of Science degree include telecommunications and networks and telecommunications network security.

Department of Engineering Management and Systems Engineering

The Department of Engineering Management and Systems Engineering administers the field of engineering management and the field of systems engineering. Both the Master of Science and Master of Engineering Management degrees are offered by the Department; in general, the Master of Science is the more technical of the two degrees. Both thesis and non-thesis options are available.

A grade of C or better in Math 32 or its equivalent is prerequisite to all graduate programs offered by the Department. The Department requires that the applicant have a suitable bachelor's degree in an area such as engineering, a physical science, or mathematics from a recognized university with a B or better average for the last two years of undergraduate study. Applicants with different academic backgrounds may be considered for admission; additional course work or other requirements may be a condition of admission in such cases.

A minimum of 36 credit hours is required, including EMSE 212, 260, 269, and 283 as the core courses in the Department. Each area of focus has specified course requirements, with electives as part of the program.

Engineering Management

Areas of Focus Leading to the Master of Engineering Management

- Economics, Finance, and Cost Engineering*
- Engineering and Technology Management*
- Environmental and Energy Management*
- Knowledge Management*
- Management and Reliability of Infrastructure Systems*

Areas of Focus Leading to the Master of Science

- Crisis, Emergency, and Risk Management*
- Engineering and Technology Management*
- Environmental and Energy Management*
- Knowledge Management*
- Software Engineering and Information Systems Management*

Systems Engineering

Areas of Focus Leading to the Master of Science

- General Systems Engineering*
- Management and Reliability of Infrastructure Systems*
- Operations Research and Management Science*

Department of Mechanical and Aerospace Engineering

The Department of Mechanical and Aerospace Engineering administers the field of mechanical and aerospace engineering. In addition to the entrance requirements stated above, the applicant is expected to have a background that includes an undergraduate degree in engineering, the physical sciences, or applied mathematics. The minimum program consists of 33 credit hours of course work or 24 credit hours of course work plus a master's thesis (6 credits). Some areas of mechanical and aerospace engineering leading to the Master of Science are offered at the NASA-Langley Research Center in Hampton, Virginia. NASA-Langley's extensive scientific and engineering facilities are used whenever possible.

Representative Areas of Focus Leading to the Master of Science

Aerospace Engineering—Required: ApSc 212 or 213 and MAE 286; one course chosen from MAE 207, 221, or 276. Students may focus their course work on aeroacoustics, aeronautics, astronautics, propulsion, or space systems.

Design of Mechanical Engineering Systems—Required: MAE 243, 251, 286. Students may focus their course work on computer-aided design, computer-integrated design and manufacturing, mechanical engineering design, and robotics.

Fluid Mechanics, Thermal Sciences, and Energy—Required: ApSc 213; MAE 221, 286.

Industrial Engineering—Prerequisite: Math 33, ApSc 115; CSci 49, 50, or 100. Required: EMSE 260, 282; MAE 201, 252; two approved three-course sequences, one in the Department of Mechanical and Aerospace Engineering, the other in a cooperating department in SEAS.

Solid Mechanics and Materials Science—Required: ApSc 213; MAE 210, 231, or 235.

Structures and Dynamics—Required: ApSc 213; MAE 207, 286.

Professional Degree Program

The School of Engineering and Applied Science has established the professional degree program for those students who wish to pursue course work beyond the master's degree with emphasis on applied subject material rather than on basic research. Successful completion of the professional degree program leads to the degree of Engineer or of Applied Scientist.

Entrance Requirements

Admission to study toward the professional degree requires an appropriate master's degree from a recognized institution and evidence of capacity for productive work in the field selected as indicated by prior scholarship and, where appropriate, professional experience. The Departments of Computer Science and of Electrical and Computer Engineering require applicants for the professional degree to have had two years of professional experience after receiving the master's degree.

To study toward the degree of Engineer, an applicant must have earned a bachelor's degree and a master's degree in an area of engineering.

To study toward the degree of Applied Scientist, an applicant must possess a master's degree in engineering, computer science, natural science, or mathematics. Applicants who have an equivalent quantitative background may be considered as special cases by the respective departments.

Normally, a *B* average in graduate work is required, although the departments often set higher admission standards. Some programs have specified prerequisites. An applicant who has significant deficiencies in preparation may be required to take prescribed prerequisite courses, which do not count toward any part of the requirements for the professional degree.

Program Requirements

The minimum program consists of 30 credit hours of approved graduate courses beyond a master's degree. Students whose graduate study does not include necessary prerequisites may be required to take additional course work.

Programs are determined by established prerequisites and the requirements of the department in which the student wishes to study. The program of each professional degree candidate must be approved by the student's advisor and the department chair.

Each department may require its degree candidates to undertake and defend the results of a technical design project or a development problem or to prepare a comprehensive technical report to demonstrate the candidate's ability to make independent use of the knowledge and discipline of thought acquired through graduate study. When applicable, the student will be informed of this requirement by the faculty advisor at the time the student's program is being formulated. The project may not be more than 6 credit hours out of the minimum 30. For requirements of a specific professional degree program, please consult the department concerned.

Scholarship Requirements

If a student studying for the professional degree receives two grades of *F* or three grades below *B-*, study is terminated and further enrollment prohibited. A student must have a final grade-point average of 3.0 to receive the degree. The

Department of Engineering Management and Systems Engineering requires a final grade-point average of at least 3.4.

Time Limits

A full-time student in the professional degree program is allowed a maximum of three calendar years to complete all degree requirements, from the date of first registration as a degree candidate in prerequisite or graduate courses. A part-time student in this program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to degree candidate status or any period spent on approved leave of absence.

Students who do not complete degree requirements within the allowed time will have their degree candidate status terminated. They may be readmitted to degree candidate status under conditions specified by the department chair.

Relationship with the Doctoral Program

Candidates for the Doctor of Science degree or professional degree who are in good academic standing may, with the approval of the faculty advisor and department chair, transfer from one degree program to the other within their department if they meet the qualifications and requirements specified by the department. In the Department of Engineering Management and Systems Engineering, only one such transfer is permitted.

Doctor of Science Degree Program

The doctoral program is designed to prepare the student for a career of creative scholarship by providing a broad but balanced background of knowledge and guidance in the performance of research. The program is divided into two stages. The first comprises a study of related fields of learning that support the general area of research concentration and culminates in the qualifying examination. The second, composed of original research and the presentation of findings in a written dissertation, culminates in the final examination.

Entrance Requirements

Admission to the Doctor of Science degree program requires an appropriate earned baccalaureate degree or master's degree from a recognized institution, completed course work designated by the department as pertinent to the field to be studied, an acceptable professional background, and a capacity for creative scholarship. Students whose highest earned degree is a baccalaureate must present a grade-point average of at least 3.3 on a scale of 4.0 in undergraduate work, submit scores from the Graduate Record Examination general test, and provide two letters of recommendation. For students whose highest earned degree is a master's degree, departmental requirements for the grade-point average in course work leading to that degree are as follows (on a scale of 4.0): Civil and Environmental Engineering, Electrical and Computer Engineering, and Mechanical and Aerospace Engineering, 3.4; Computer Science, and Engineering Management and Systems Engineering, 3.5. In Computer Science, the GRE is required for all students applying to the doctoral program. For other SEAS departments, an applicant who has taken the GRE should request that the scores be sent to the School of Engineering and Applied Science.

Consult the department concerned for field-specific admission requirements.

Program Requirements

Upon admission to the first stage of the program (that is, study of related fields culminating in the qualifying examination), the student is assigned a faculty ad-

visor who directs his or her studies. In some departments a faculty committee may be appointed instead of a single advisor. Programs of study are structured to include a major field and two minor or supporting fields. Check with the department concerned for requirements.

A minimum of 30 credit hours in a formal program at the graduate level beyond master's study or, for students without master's degrees, a minimum of 54 credit hours in a formal program at the graduate level beyond the baccalaureate, is required. In many cases, particularly when the student undertakes a doctoral program in a field other than that in which the earlier degree was obtained, the program of study exceeds the minimum number of credit hours. Consult the department concerned for specific curriculum requirements. In addition, all doctoral students take a minimum of 24 hours of dissertation research.

Departments may establish a tool requirement, such as an examination in a computer language.

The Department of Computer Science requires a preliminary examination that must be passed within four semesters of starting the program. It comprises core material from CSci 210, 211, and 212 but is not limited to these courses.

Students admitted to doctoral study are encouraged to undertake one year of full-time study on campus. In general, the advisor will require the student to register for a minimum of 6 credit hours of course work in every fall and spring semester.

To be admitted to the qualifying examination, the student must have an overall grade-point average of 3.2. The Department of Engineering Management and Systems Engineering requires a cumulative grade-point average of at least 3.4.

If a doctoral student receives two grades of *F* or three grades below *B-*, graduate study is terminated and further enrollment prohibited. Courses in which the student earns grades below *B-* are not included in the total credit-hour requirement for the degree. Students who receive any grade below *B-* are required to review their programs of study with their advisors.

The Qualifying Examination

The qualifying examination is the principal means of determining whether a student will qualify as a candidate for the doctoral degree and progress to the second stage of the program. Its purpose is to ascertain that the student's background and intellectual development are adequate to support doctoral research in the central field. (Some departments may administer a prequalifying examination prior to completion of the study program.)

Qualifying examinations may be written or oral, or both, and are scheduled over a period of several days. They are conducted on dates established by the departments and are administered by a faculty committee. Upon favorable report of the examiners to the dean through the department chair, the student is admitted to candidacy for the degree; the student then begins specialized study and research under the supervision of a designated member of the faculty or, in special instances, an outstanding engineer or scientist who is not a member of the faculty.

At the discretion of the committee that prepared the examination, a student who fails any part of the qualifying examination may be given a second opportunity to qualify for candidacy. Usually, the entire examination must be retaken.

Students who fail to qualify for candidacy in a doctoral program of the School will be considered to have failed on a school-wide basis and will not be admitted to further doctoral study within the School.

Dissertation and Final Examination

The student admitted to candidacy for the degree of Doctor of Science chooses the faculty member under whom he or she wishes to conduct research; the faculty member may accept or reject the request to serve as the student's director

of research. The research area is approved by the director, and throughout the remainder of the doctoral program the candidate conducts dissertation research under the director. However, the student may consult other members of the faculty on an informal basis. Work on the dissertation encompasses a minimum of 24 credit hours.

The Dissertation—A dissertation is required as evidence of ability to perform original scholarly research and to present and interpret the results. The student is solely responsible for the content of the dissertation.

The dissertation should embody the results of an extended original study and include material deemed worthy of publication in recognized scientific and engineering journals. The student is expected to attempt to have the results of the research published as soon as possible after he or she receives the degree and to submit copies of the published material to the dean. The Department of Engineering Management and Systems Engineering requires submission of an article to a refereed journal prior to completion of degree requirements. Credit must be given in the publication to the fact that the material is abstracted, summarized, or developed from a dissertation submitted to George Washington University in partial fulfillment of the requirements for the Doctor of Science degree.

The candidate must submit to the department five complete copies of the dissertation and an abstract (not to exceed 350 words). Copies of detailed regulations regarding the form and reproduction of the dissertation and preparation of the abstract are available in department offices. Accepted dissertations, with accompanying drawings, become the property of the University and are deposited in the Gelman Library, where bound copies are available for circulation.

The Final Examination—Upon acceptance of the dissertation by the research committee, the candidate is presented for the final examination. The final examination is oral and is open to the public. The candidate must demonstrate a mastery of the special field of study and of the materials and techniques used in the research. The committee of examiners may include qualified experts brought to the University especially to participate in the examination. The director of research usually serves as advocate for the candidate. Students should consult department regulations concerning the formation of the committee. When the examining committee is convinced of the quality and originality of the candidate's contribution to knowledge as well as his or her mastery of the scholarship and research techniques of the field, the committee recommends the candidate for the degree of Doctor of Science. The candidate should consult the department chair about scheduling the examination.

Students completing their degree program should refer to the section on Graduation Requirements, Participation in the Commencement Ceremony, under University Regulations, as well as the fee for microfilm service and binding the dissertation under Fees and Financial Regulations in this Bulletin.

Enrollment Requirements

Full-time doctoral students must register for a minimum of 9 hours per semester until 24 hours of Dissertation Research have been completed, and 1 hour of Continuing Research each semester thereafter until satisfactory completion of the final examination. Part-time doctoral students must normally register for a minimum of 6 hours per semester until 24 hours of Dissertation Research have been completed and 1 hour of Continuing Research each semester thereafter until satisfactory completion of the final examination. No minimum load is required during the summer sessions.

Time Limits

In general, one year of study is the minimum amount of time to be spent in preparation for the qualifying examination, although the student may apply for

the examination whenever he or she feels properly prepared. The qualifying examination must be completed within five years of the date of admission, and the entire degree program must usually be completed within seven years. A minimum of two years of full-time study and research should be expected in meeting the requirements for the degree. The time period for completion of the degree will be adjusted for an approved leave of absence. All time periods listed above are increased by two years for a student entering the doctoral program without a master's degree.

Graduate Certificate Programs

The School of Engineering and Applied Science offers graduate certificate programs in several fields. At the discretion of the respective departments, credit earned in the certificate program can be applied to a subsequent master's degree program. Details are available in the Office of the Dean.

ELLIOTT SCHOOL OF INTERNATIONAL AFFAIRS

Dean H. Harding

Associate Deans H. Feigenbaum, B.D. Miller

The Elliott School of International Affairs offers graduate and undergraduate programs to prepare individuals for understanding and working in an increasingly globalized world. The historical roots of the Elliott School extend back to the establishment of the School of Comparative Jurisprudence and Diplomacy in 1898. In 1966, the School separated from the School of Government, Business, and International Affairs to become an independent unit, the School of Public and International Affairs. In 1987, the name was changed to the School of International Affairs, and in 1988 the School was renamed in honor of Evelyn E. and Lloyd H. Elliott. Lloyd Elliott was the President of The George Washington University from 1965 to 1988.

Master's Degree Programs

The Elliott School offers degree programs leading to the Master of Arts in the fields of international affairs, Asian studies, European and Eurasian studies, international development studies, international trade and investment policy, Latin American studies, security policy studies, and science, technology, and public policy. The Elliott School also offers a Master of International Policy and Practice degree for mid-career professionals and a Master of International Studies degree for students enrolled in master's degree programs at universities with which the Elliott School has a special partnership.

These programs provide advanced academic and professional training in international affairs as preparation for employment in public, private, and non-profit sectors. Focusing on major historical and contemporary issues in international affairs, the programs are both interdisciplinary and multidisciplinary, combining courses offered through the School with courses offered by other schools and departments of the University.

Admission Requirements

Admission is normally for the fall semester and may be for full- or part-time study. Admission to master's programs in the Elliott School is highly competitive. To be considered for admission, applicants must present a bachelor's degree from an accredited college or university. Records of academic performance, letters of recommendation, and a personal statement are the principal components of an application. Scores on the general test of the Graduate Record Examination are required for Master of Arts applicants and encouraged but not required for Master of International Policy and Practice applicants. In addition, the applicant's motivation, professional experience, and academic preparation in economics and foreign language study will be considered in the selection process. Eight years of professional experience are generally required of Master of International Policy and Practice applicants.

The following additional requirements pertain to all applicants whose native language is not English and who have not graduated from a college or university in which English is the language of instruction—Applicants are required to submit scores from the Test of English as a Foreign Language (TOEFL). The Test of Written English (TWE) is also recommended. To be considered for admission, applicants are normally expected to score 600 or better on the paper-based TOEFL exam or 250 or better on the computer-based TOEFL exam. Applicants admitted as degree candidates will be required to take the English as a Foreign Language (EFL) Placement Test at George Washington University before registering. (Those who score 620 or more on the paper-based TOEFL or 260 or

better on the computer-based TOEFL and 5 or better on the TWE are exempted.) EFL course work may be required, depending on the applicant's performance on the placement test, but may not be applied toward the degree. Students who are required to take EFL courses must do so at their own expense and may find that their progress toward completing the degree may be delayed.

International Affairs—The applicant's undergraduate program should include courses in international affairs or other relevant social sciences, including introductory micro- and macroeconomics and at least two years of undergraduate study of a modern foreign language. In the case of major deficiencies in the social sciences (especially economics) or foreign language preparation, additional course work may be specified beyond the minimum requirements for the master's degree.

Asian Studies—An undergraduate major in a pertinent field and at least two years of study of an appropriate Asian language are required.

European and Eurasian Studies—An undergraduate major in a relevant field is preferred, including a good background in European history and political systems. The undergraduate program should include satisfactory completion of at least two years of an appropriate European or Eurasian language.

International Development Studies—The applicant's undergraduate program should include courses in international affairs or other relevant social sciences, including introductory microeconomics, a course in statistics, and at least two years of study of a modern foreign language. International experience in development or a related field is important and can compensate for gaps in academic preparation.

International Trade and Investment Policy—The applicant's undergraduate program should include at least one semester each of intermediate microeconomic theory, intermediate macroeconomic theory, statistics, and at least two years of study of a modern foreign language. Undergraduate courses in intermediate micro- and macroeconomics are highly desirable.

Latin American Studies—The applicant's undergraduate program should include background course work related to Latin America and at least two years of study of Spanish or Portuguese. Majors in other fields may be considered for admission provided that undergraduate course work includes Spanish or Portuguese and sufficient course work in one of the following areas: anthropology, economics, geography, Hispanic literature, history, and political science.

Science, Technology, and Public Policy—Undergraduate majors in a social, life, or physical science or in engineering are eligible for admission. Analytic skills and interest in policy issues with significant science or technology dimensions are more important determinants of success in the program than any particular formal training or academic background.

Security Policy Studies—An undergraduate background similar to that specified above for International Affairs would be appropriate. Work experience in the military or national security fields might compensate in part for some gaps in academic preparation. A background in economics or quantitative analysis skills is helpful.

Readmission

A graduate student who has not been continuously enrolled or on approved leave of absence must file an application for readmission the semester before planning to return to school.

Scholarship Requirements

Information on grades and computing the grade-point average is under University Regulations. Courses taken to satisfy degree requirements cannot be taken on a Credit (CR) basis, with the exception of Thesis Research and capstone courses for M.A. students and the M.I.P.P. Seminar for M.I.P.P. students.

Graduate students are required to maintain a minimum cumulative grade-point average of 3.0. Students whose cumulative grade-point average falls below 3.0 at any time after having completed at least 9 credit hours will be given an additional semester in which to raise the grade-point average above 3.0. Those who fail to bring their grade-point average over 3.0 at the end of the additional semester will not be allowed to continue in the program. For part-time students and those enrolled in summer sessions, a semester is interpreted to mean a time interval in which at least 9 credit hours have accrued.

A master's candidate who receives a grade of *F* is required to present cause as to why he or she should be allowed to continue in the program of studies.

The symbol *I* (Incomplete) indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. When work for the course is complete, the grade earned will be indicated by the letter *I* followed by the letter grade. An Incomplete cannot be made up after the lapse of one calendar year. An Incomplete that is not made up by the end of one calendar year becomes a grade of *IF* on the student's record. An Incomplete cannot be removed by reregistering for the course. If there are more than two Incompletes outstanding on the record, the student is not permitted to register for any courses, including the capstone course.

A student who fails to meet the established deadlines for completion of course work or other requirements of the program and is granted an extension may be required by the dean and the Dean's Council to register for 3 credit hours of graduate Reading and Research for each semester that the work is delinquent.

General Requirements for Master of Arts Degree Programs

Programs leading to the Master of Arts degree require a minimum of 40 credit hours of graduate course work and may include a thesis (the Security Policy Studies program does not have a thesis option). In all programs, students must pass a multidisciplinary capstone course at the conclusion of their program.

Candidates for the degree of Master of Arts are required to submit an advisor-approved plan of study (fields, supporting course work, etc.) to the office of student services by the end of the first semester in residence. Master's degrees are awarded by vote of the faculty after the student has completed the required course work and an acceptable thesis (if one is elected), has satisfied the foreign language requirement, and has successfully completed the capstone course.

Under special circumstances undergraduate courses numbered 101-200 may be counted toward the master's degree when registration for graduate credit has been approved at the beginning of the course by the curriculum advisor, the instructor, and the dean. The student who takes an undergraduate course for graduate credit is expected, by arrangement with the instructor, to do work at the graduate level in addition to the regular work of the course. Normally, no more than 9 hours of undergraduate course work may be taken for graduate credit in the 40-credit-hour program. Academic credit counted toward a previous degree may not be counted toward the master's degree.

All master's degree candidates must complete degree requirements within five years of their admission to the program. A student who is unable temporarily to continue the plan of studies may request a leave of absence not to exceed one year. Extensions beyond the five-year period may be granted in exceptional circumstances, but the student will be required to register and pay for 3 credit hours of Reading and Research each semester.

No more than 6 hours of graduate credit may be transferred from other accredited institutions or another division of the University, and these may be accepted only under limited conditions of time, grades, and relevance to the student's program.

Curriculum Requirements

Curriculum requirements for the Master of Arts programs are listed under the appropriate heading in Courses of Instruction—International Affairs; Asian Studies; European and Eurasian Studies; International Development Studies; International Trade and Investment Policy; Latin American Studies; Science, Technology, and Public Policy; and Security Policy Studies. Students should consult the program director concerning Special Topics courses that may be applicable to their program.

Foreign Language Requirements

In most degree programs, a candidate for the degree of Master of Arts must demonstrate reading and speaking proficiency (certified by the relevant language department) in a modern foreign language. Students in regional programs must demonstrate their ability in a language appropriate to the study of the specific region. If a student selects a language not offered by the University, a testing fee will be charged.

Each student whose native language is English must take a diagnostic exam in a foreign language during graduate student orientation. Students must also pass a reading and oral proficiency exam during the last 20 hours of residence in the program. No student may take the proficiency examination more than three times. Students should consult their program guidelines for specific requirements, possible academic credit, and options concerning the language requirement.

Candidates in security policy studies may substitute advanced course work in statistics for a foreign language. Candidates in science, technology, and public policy have no foreign language requirement; however, proficiency in a foreign language may be used to meet the program's analytical competency requirement if it can be shown to be integral to the student's program of study.

For all Elliott School degree programs, students who are not native speakers of English are also required to pass an English examination; this requirement is in addition to the TOEFL required for admission. The examination, which tests high-level reading and writing proficiency, is administered by the English as a Foreign Language Department, and should be successfully completed before the end of the candidate's second semester. This requirement is in addition to the statistics requirement in the security policy studies program and the analytical competency requirement in the science, technology, and public policy program.

Capstone Course

Every student must successfully complete a capstone course near the conclusion of the master's program. Most programs offer the capstone course once a year, during the spring semester. The student must have a 3.0 grade-point average and must have completed or registered for 30 hours before participating in the course. If there is a lapse of time between completion of other course work and the capstone course, the student must be continuously enrolled during this period. A student who fails to successfully complete the capstone course may repeat it with the permission of the dean. If the student fails a second time, no further opportunity to complete the course will be permitted and the degree will not be conferred. Details concerning the capstone course vary across programs. Students should consult their program guidelines for details.

Thesis Option

Exceptional students may write a thesis if they qualify by having a minimum 3.5 grade-point average for at least 20 hours of course work in their program, submitting for approval a previously written research paper of high quality, and developing a formal thesis proposal approved by their prospective thesis advisor.

The thesis subject should be selected as early as possible so as to permit effective integration with the course work. A student will not be permitted to register for Thesis Research (IAff 299-300) until the thesis subject has been formally submitted to the dean's office. Most programs set additional requirements in order to qualify to write a thesis. The subject must be approved by the member of the faculty under whom the thesis is to be written, a second member of the faculty who will serve as a reader, and the student's program director. The thesis in its final form must have the approval of the thesis director and one other reader, and two copies must be presented to the dean by the student no later than the date announced in the University Calendar. Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the student services office. A fee for binding must be paid upon completion of the thesis.

Payment of tuition for thesis research entitles the candidate, during the period of registration, to the advice and direction of the thesis director and the other reader. In case a thesis is unfinished, the student must maintain continuous enrollment and is allowed one calendar year to complete it. If the preparation of the thesis extends beyond the additional calendar year, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

General Requirements for the Master of International Policy and Practice Degree Program

The Master of International Policy and Practice requires a minimum of 27 credit hours of graduate course work. Students are required to take one course in either international or comparative politics, one course in international economics, and the M.I.P.P. Seminar. For the remainder of the program, students must submit an advisor-approved plan of study to the program director before the start of the first semester in residence and to the student services office by the end of the first semester in residence.

Under special circumstances undergraduate courses numbered 101-200 may be counted toward the master's degree when registration for graduate credit has been approved at the beginning of the course by the program director, the instructor, and the dean. The student who takes an undergraduate course for graduate credit is expected, by arrangement with the instructor, to do work at the graduate level in addition to the regular work of the course. No more than 6 hours of undergraduate course work may be taken for graduate credit in the 27-hour program.

M.I.P.P. candidates must complete degree requirements within three years of their admission to the program. A student who is temporarily unable to continue the plan of studies may request a leave of absence not to exceed one year. Extensions beyond the three-year period may be granted in exceptional circumstances, but the student will be required to register and pay for 3 credit hours of Reading and Research each semester.

No transfer credit from any institution other than The George Washington University is accepted into the M.I.P.P. program. No more than 6 hours of graduate credit taken in any degree or nondegree status within The George Washington University, including the Elliott School, may be transferred to the M.I.P.P. program.

Special Programs

Joint Master of Arts and Juris Doctor Degree Program

The Elliott School of International Affairs cooperates with the Law School in offering a program of study leading to the degrees of Master of Arts and Juris Doctor. A student must be accepted for admission by both the Elliott School and the Law School. Applications should be made separately to each school, with a notice of interest in the combined program. Students may also apply for the joint degree program after they have begun either program. The Law School stipulates that the first year of course work for the Juris Doctor degree must be taken as a unit; students should consult with the Associate Dean of the Law School for Student Affairs.

The Master of Arts degree program consists of a 40-credit-hour program that may not include a thesis. The student selects a degree program offered by the School and fulfills all of the requirements for the Master of Arts degree as well as fulfilling the requirements for the Juris Doctor degree. As part of this program, each School accepts up to 12 credit hours of course work from the other school in fulfillment of its degree requirements. The program takes approximately four years of full-time study for completion.

Joint degree students must meet all requirements for both programs prior to receiving either diploma. All work for this combined degree program must be completed in five years, unless an extension of time is granted by the respective deans.

Joint Master of Arts and Master of Business Administration Degree Program

The Elliott School of International Affairs cooperates with the School of Business and Public Management in offering a program of study leading to the degrees of Master of Arts in one of six fields and Master of Business Administration with a field of study in international business. The joint degree program is offered in the Elliott School fields of international affairs, international trade and investment policy, Asian studies, European and Eurasian studies, and Latin American studies. The student must be accepted for admission by both the Elliott School and the School of Business and Public Management. Applications should be made separately to each school, with a notice of interest in the combined program. Students may also apply for the joint degree program after they have begun either program.

The joint degree program consists of 66–70 credit hours of course work. As part of this program, each school accepts up to 12 credit hours of course work from the other school in fulfillment of its degree requirements. The program takes approximately 3 years of full-time study for completion. Joint degree students must meet all requirements for each program prior to receiving either diploma. All work for this combined degree program must be completed in six years, unless an extension of time is granted by the respective deans.

Dual Master of Arts and Master of Public Health Degree Program

The Elliott School of International Affairs cooperates with the School of Public Health and Health Services in offering a dual degree program leading toward the Master of Arts in one of five fields and the Master of Public Health in the international health track. The dual degree program is offered in the Elliott School fields of international affairs, international development studies, Asian studies, and Latin American studies. The student must be accepted for admission by both the Elliott School and the School of Public Health and Health Services. Applications should be made separately to each school, with a notice of interest in the combined program. Students may also apply for the dual degree program after they have begun either program.

The joint degree program consists of approximately 68 credit hours of course work. As part of this program, the Elliott School accepts up to 12 credit hours of course work from the School of Public Health and Health Services in fulfillment of its degree requirements. The program takes approximately three years of full-time study for completion.

Dual degree students may complete the requirements for each degree and receive a diploma for each degree independently. However, all work on each degree must be completed within five years from the student's entry into that program, unless an extension of time is granted by the respective deans.

Graduate Certificates

The Elliott School of International Affairs offers programs of study leading to a graduate certificate in regional studies in Asian studies, European and Eurasian studies, and Latin American studies, and topical specialties in international trade policy, international science and technology policy, international security policy, U.S. foreign policy, and political psychology. The program is open to all graduate students presently enrolled in the Elliott School, Columbian College of Arts and Science, the Graduate School of Education and Human Development, the School of Business and Public Management, and the School of Public Health and Health Services at The George Washington University, and to graduate students from other universities, persons who have already earned a graduate degree, and persons with a bachelor's degree and a minimum of eight years of relevant work experience. Additional information is available in the Elliott School Graduate Admissions office.

Master of International Studies

The Master of International Studies is open only to students in master's degree programs at universities with which the Elliott School has developed special partnerships. Consult the Elliott School for specific requirements.

COLLEGE OF PROFESSIONAL STUDIES

Dean R. Whitaker

The College of Professional Studies was established in 2001 to offer degree programs leading to associate's, bachelor's, and master's degrees in professional studies. The College also administers off-campus programs offered by other schools of the University. The staff of instruction for the College includes members of the full-time faculty of the University and academically qualified adjunct faculty from the professional community.

All University off-campus offerings in Maryland are approved by the Maryland State Board for Higher Education; those in Virginia are approved by the Commonwealth of Virginia Council of Higher Education.

At the time of going to press, no degrees in Professional Studies were offered for open enrollment. Degree and certificate programs offered by other schools and administered through the College of Professional Studies off-campus division are listed below.

Students wishing to apply for admission to an off-campus degree program may obtain application forms from the school concerned, the College of Professional Studies, or online at www.gwu.edu/~gradinfo.

Columbian College of Arts and Sciences—For degree program information, see the program concerned under Courses of Instruction: Master of Arts in the fields of human resources management and organizational management (see Organizational Sciences), criminal justice with concentrations in computer fraud investigation and security management (see Forensic Sciences), legislative affairs, and telecommunication; Master of Fine Arts in the field of classical acting (see Theatre and Dance). In addition, graduate certificates are available in survey design and data analysis, security management, computer fraud investigation, and leadership coaching; consult the school for requirements.

School of Business and Public Management—For degree program information, see the section on the School of Business and Public Management: Master of Business Administration; Master of Science in Information Systems Technology (management information systems); Master of Science in Project Management; Master of Tourism Administration.

School of Engineering and Applied Science—For degree program information, see the section on the School of Engineering and Applied Science: Master of Engineering Management; Master of Science and Doctor of Science in the fields of engineering management and systems engineering. In addition, graduate certificates are available in knowledge management, information security management, and systems engineering; consult the school for requirements.

Graduate School of Education and Human Development—For degree program information, see the section on the Graduate School of Education and Human Development: Master of Arts in Education and Human Development in the fields of educational technology leadership, educational leadership and administration, higher education administration, human resource development, and school counseling; Master of Education in the field of secondary education; Education Specialist in the field of educational leadership and administration; Doctor of Education in the fields of higher education administration and educational administration and policy studies.

Courses



COURSES OF INSTRUCTION

The following section provides listings and descriptions of graduate courses offered by the departments of instruction and interdepartmental programs.

Degree requirements of departments and programs in Columbian College of Arts and Sciences and the Elliott School of International Affairs appear under the department or program heading; degree requirements of the School of Engineering and Applied Science, the Graduate School of Education and Human Development, and the School of Business and Public Management appear under the respective school's section.

To determine the content of required or prerequisite courses below the 200 level, see the *Undergraduate Programs Bulletin*.

The number of credit hours given for the satisfactory completion of a course is, in most cases, indicated in parentheses after the title of the course. Thus, a year course giving 3 credit hours each semester is marked (3-3), and a semester course giving 3 credit hours is marked (3). A credit hour may be defined as one 50-minute period of class work or one laboratory period a week for one semester.

Following most course descriptions is a parenthetical statement listing the semester (fall or spring) for which the course is scheduled. The term *academic year* is used only with two-semester courses and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester. Not all offerings for the summer sessions are listed in this Bulletin. Students should consult the Summer Sessions Announcement for additional summer offerings. Schedules of Classes are published for the fall and spring semesters to provide information concerning the time of course offerings.

The courses as listed here are subject to change. The University reserves the right to withdraw any course announced or to change the course fees shown.

Key to Abbreviations

The following abbreviations are used for course designations:

Accy	Accountancy	Educ	Educational Leadership
AmSt	American Studies	ECE	Electrical and Computer Engineering
Anat	Anatomy	EMda	Electronic Media
Anes	Anesthesiology	EMed	Emergency Medicine
Anth	Anthropology	EMSE	Engineering Management and Systems Engineering
ApSc	Applied Science	Engl	English
Arab	Arabic	EFL	English as a Foreign Language
AH	Art History	EnRP	Environmental and Resource Policy
ArTh	Art Therapy	Epid	Epidemiology
Astr	Astronomy	EMBA	Executive Master of Business Administration
Bioc	Biochemistry	ExSA	Exercise and Sport Activities
BiSc	Biological Sciences	ExSc	Exercise Science
BmSc	Biomedical Sciences	Film	Film Studies
Bios	Biostatistics	Fina	Finance
BAdm	Business Administration	FA	Fine Arts
Chem	Chemistry	ForS	Forensic Sciences
Chin	Chinese	Fren	French
CE	Civil Engineering	Gnet	Genetics
Clas	Classical Studies	Geog	Geography
CCAS	Columbian College of Arts and Sciences	Ger	German Language and Literature
Comm	Communication	Grek	Greek
CSci	Computer Science	HCS	Health Care Sciences
Cnsl	Counseling		
EES	Earth and Environmental Sciences		
Econ	Economics		

HSci	Health Sciences	Ped	Pediatrics
HSMP	Health Services Management and Policy	Phar	Pharmacology
Hebr	Hebrew	Phil	Philosophy
Hist	History	Phys	Physics
HomP	Hominid Paleobiology	Phyl	Physiology
Honr	Honors	PCm	Political Communication
HDev	Human Development	PMgt	Political Management
HRD	Human Resource Development	PPsy	Political Psychology
HmSc	Human Sciences	PSc	Political Science
HmSr	Human Services	Port	Portuguese
Hmn	Humanities	PsyD	Professional Psychology
Immu	Immunology	Pchi	Psychiatry and Behavioral Sciences
Idis	Interdisciplinary Courses	Psyc	Psychology
IAff	International Affairs	PAd	Public Administration
IBus	International Business	PubH	Public Health
Ital	Italian	PPol	Public Policy
Japn	Japanese	Rad	Radiology
Jour	Journalism	Rel	Religion
Kor	Korean	Rom	Romance Literatures
Latn	Latin	SEAS	School of Engineering and Applied Science
Law	Law	SMPA	School of Media and Public Affairs
Ling	Linguistics	SLP	Service-Learning Program
Mgt	Management Science	Slav	Slavic Languages and Literatures
Mktg	Marketing	Soc	Sociology
MBAd	Master of Business Administration	Span	Spanish
Math	Mathematics	SpEd	Special Education
MAE	Mechanical and Aerospace Engineering	SpHr	Speech and Hearing
Med	Medicine	Stat	Statistics
Micr	Microbiology	SMPP	Strategic Management and Public Policy
Onco	Molecular and Cellular Oncology	Surg	Surgery
MStd	Museum Studies	TrEd	Teacher Education
Mus	Music	TCom	Telecommunication
NSc	Naval Science	TrDa	Theatre and Dance
NSur	Neurological Surgery	TStd	Tourism Studies
Neur	Neurology	Univ	University
NeuS	Neuroscience	Urol	Urology
Ob&G	Obstetrics and Gynecology	Viet	Vietnamese
Opht	Ophthalmology	WLP	Women and Leadership Programs
OrSc	Organizational Sciences	WStu	Women's Studies
Orth	Orthopaedic Surgery	Ydsh	Yiddish
Path	Pathology		
PSid	Peace Studies		

Explanation of Course Numbers

Courses numbered 1-100 are planned for students in the freshman and sophomore years. With the approval of the advisor and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisites to advanced courses, but they may not be taken for graduate credit.

Courses numbered 101-200 are planned for students in the junior and senior years. Except for accountancy courses, they may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work to receive graduate credit. Accountancy courses numbered 101-200 may not be taken for graduate credit.

Courses numbered 201-300 are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are

not open to other undergraduates. Qualified seniors in the School of Business and Public Management registering for these courses must have a 3.0 average, the prior approval of the department chairman who is responsible for the graduate course, and the prior approval of the dean. Nondegree students who have not completed a bachelor's degree may not enroll in graduate courses offered by the School of Business and Public Management. A few courses are numbered in the 400s and 600s to set them apart for various administrative reasons; these courses are generally analogous to courses numbered in the 200s.

Courses numbered 301–400 in Columbian College of Arts and Sciences and the School of Engineering and Applied Science are limited to graduate students, but they are primarily for doctoral candidates. Courses numbered 301–400 in the School of Business and Public Management are primarily for doctoral students; the courses are open to selected master's students upon approved petition. In the Graduate School of Education and Human Development courses numbered 301–400 are limited to graduate students with master's degrees from accredited institutions.

Courses numbered 701 and 721 represent an ongoing program of curriculum innovation at GW. The 701 number is used to designate experimental courses taught by individual faculty members. The 721 number designates innovative interdepartmental courses. The 751 number is used to list courses sponsored jointly by two or more schools. Courses numbered in the 770s and 780s are taught by scholars who hold appointments as University Professors. The 700 numbers do *not* indicate the level of difficulty. Courses in this series range from freshman-level offerings to classes designed for seniors and graduate students. Unless the course description in the *Schedule of Classes* indicates that there are prerequisites or that an interview with the instructor is required prior to registration, 700 courses are open to all interested students, subject to their advisor's approval and the rules of the respective schools.

ACCOUNTANCY

Professors C.M. Paik, J. Hilmy, D.R. Sheldon, W.R. Baber, K.R. Kumar

Associate Professors L.G. Singleton, K.E. Smith (*Chair*), L.C. Moersen, F. Lindahl, S.H.

Kang, M. Yahya-Zadeh

Assistant Professors G. Visvanathan, C.L. Jones, R.L. Tarpley, W.L. Yeager (*Visiting*)

See the School of Business and Public Management for programs of study in accountancy leading to the degrees of Master of Accountancy and Doctor of Philosophy.

201 Financial Accounting (2)

Visvanathan, Sheldon

Basic concepts and methods used in financial statements. Use and preparation of the income statement, balance sheet, and statement of cash flows; application of concepts to accounting and reporting issues, including revenue and expense recognition, cash, receivables, inventory, marketable securities, long-lived assets, and debt and equity securities. Same as MBAd 210. (Fall and spring)

202 Management Accounting (2)

Paik, Lindahl

The role of accounting in the decision-making processes of management; understanding of how accounting influences resource allocation decisions in the organization. Prerequisite: Accy 201 or MBAd 210. Same as MBAd 211. (Fall and spring)

211 Business Law: Contracts, Torts, and Property (3)

Yaeger

Essential legal principles of contracts, torts, and property, including trusts and estates, leases, professional liability, and the Uniform Commercial Code. Same as SMPP 211. (Fall)

212 Business Law: Enterprise Organization (3)

Yaeger

The legal aspects of organizing, financing, and operating an enterprise: agency, partnerships, corporations, securities regulation, insurance, suretyship, secured credit financing, and commercial paper. Same as SMPP 212. (Spring)

- 221 **Cost and Budget Analysis (3)** Paik
An advanced cost analysis course, with emphasis on comparative costs, quantitative techniques for cost data, managerial reporting systems, and manufacturing efficiency studies. Prerequisite: Accy 201 and 202 or MBAd 210 and 211. (Spring)
- 225 **Financial Reporting Standards (3)** Sheldon
A critical understanding of the Financial Accounting Standards Board Pronouncements and professional standards for compilation of financial statements. Analysis of alternative accounting treatments by management in financial reporting. Prerequisite: Accy 201 or MBAd 210. (Fall)
- 251 **International Accounting (3)** Hilmy
A study of international accounting standards with emphasis on accounting for foreign conversion requirements compatible with domestic accounting consolidation standards. Prerequisite: Accy 201 or MBAd 210. (Fall and spring)
- 261 **Federal Income Taxation (3)** Smith
A study of federal income taxation, covering gross income, deductions and credits, sales and other disposition of property, capital gains and losses, and timing. (Fall and spring)
- 262 **Federal Income Taxation of Partnerships (3)** Smith
Financial and tax accounting for partnerships; formation and operation, distribution to partners, liquidation, and transfer of partnership interests. S corporations are considered. Prerequisite: Accy 261. (Spring)
- 263 **Federal Income Taxation of Corporations (3)** Smith
Federal income taxation of C and S corporations, covering formation, capital structure, nonliquidating distributions, complete liquidations, corporate accumulations, and the alternative minimum tax. Prerequisite or concurrent registration: Accy 261. (Fall and spring)
- 264 **Federal Taxation of Estates and Gifts (3)** Staff
An introduction to the federal taxation of wealth transfers and the income taxation of estates and trusts. Topics include assets that comprise the gross estate, deductions, valuation and liquidity problems, and estate planning. Prerequisite: Accy 261. (Spring)
- 275 **Contemporary Auditing Theory (3)** Staff
A comprehensive survey of contemporary auditing as practiced by external auditors (primarily certified public accountants) and internal auditors (those employed within government and corporate entities). Generally accepted auditing standards; government auditing standards. Planning, directing, and reporting on various audits. Prerequisite: Accy 225. (Spring)
- 276 **Government Accounting and Auditing (3)** Staff
Government budgeting, accounting, financial reporting, and auditing required of state and local governments, nonprofit organizations, and colleges and universities. The financial management practices and auditing requirements applicable to private and public sector organizations receiving governmental financial assistance and those subject to governmental audits. (Spring)
- 282 **Accounting Information Systems and EDP (3)** Staff
Development and application of accounting system theory, including analysis, design, control concepts, and implementation. Integration of electronic data processing, accounting systems, and management information systems. Prerequisite: Accy 201 or MBAd 210. (Fall)
- 290 **Special Topics (3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall and spring)
- 291 **Financial Statement Analysis (3)** Hilmy, Kang
Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors; establishing firms' business profiles; balance-sheet restructuring and the identification of financial and accounting correction measures from financial statements. Prerequisite: Accy 201 or MBAd 210. (Fall and spring)
- 298 **Directed Readings and Research (1 to 3)** Staff
- 311 **Seminar: Public-Private Sector Institutions and Relationships (3)** Staff
Same as SMPP 311.

- 391 **Doctoral Seminar (arr.)** Baber, Kumar
Reasoning and research in technical areas of accounting; theoretical issues and their application to practice; conceptual themes in professional literature; comparative accounting research analyses. (Fall and spring)
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 397 **Doctoral Seminar (1 to 3)** Staff
- 399 **Dissertation Research (arr.)** Staff
Limited to doctoral candidates. May be repeated for credit.

AMERICAN STUDIES

Professors B.M. Mergen, J.M. Vlach, J.O. Horton, R.W. Longstreth, J.A. Miller, P.M. Palmer
Associate Professor J.A. Murphy (Chair)
Assistant Professors M. McAlister, C. Heap
Adjunct Associate Professors B.G. Carson, E. Mayo
Associate Professorial Lecturers R.D. Wagner, D.P. Tiller, O. Ridout

Master of Arts in the field of American studies—Prerequisite: the degree of Bachelor of Arts in American studies or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) AmSt 231; (2) 21 credit hours chosen in a carefully related pattern of study of American civilization that includes at least one research seminar; (3) a comprehensive examination covering general competence in American studies and the candidate's area of concentration; (4) a thesis (6 credit hours) written on a topic approved by the student's advisor or, with permission of the advisor and the director of the program, 12 credit hours of additional course work, 6 of which must be research oriented. Special concentrations in the master's degree program include the following.

1. *A concentration in museums and material culture*—Course emphasis on the use of artifacts in historical research, offered in association with the Smithsonian Institution. Required in addition to the general requirements outlined above: AmSt 250. Recommended: courses in decorative arts, architectural history, historical archaeology, history of technology, history of art, and folklife. Programs specific to museum studies and museum education are also available.

2. *A concentration in historic preservation*—Course emphasis on interpreting issues in historic preservation through a humanistic framework. Prerequisite: a course in American architectural history. For this concentration, the general requirements outlined above are amended as follows. Required: 36 credit hours, consisting of 12 hours of American studies courses including AmSt 231 and at least one research seminar; 18 hours of historic preservation courses including AmSt 277-78; an optional thesis (6 hours) or two additional electives. A comprehensive examination, as outlined above, is required.

3. *A concentration in folklife*—Course emphasis on the expressive culture of American folk societies and theories and methods for their evaluation and interpretation. Required in addition to the general requirements outlined above: AmSt 256, 257. Recommended: courses in topics related to folklife, such as regionalism, oral history, material culture, vernacular architecture, and social and cultural history.

Doctor of Philosophy in the field of American studies—This program combines work in the humanities and/or social sciences as preparation for careers in a range of institutions, including universities, museums, archives, libraries, preservation offices, and related public and private enterprises. Applicants are required to have an adequate background in the humanities and/or social sciences as they apply to the understanding of American studies.

Required: the general requirements stated under Columbian College of Arts and Sciences and successful completion of a reading knowledge examination in an approved foreign language. All students must take AmSt 231 and a research seminar approved by the advisor. Candidates must pass a General Examination in three areas, to be taken over the course of one month, by the end of the third year from matriculation. The three fields are elected with approval of the advisory committee; one field may represent foreign coverage. Other areas may be chosen from American diplomatic, economic, political, social, cultural, or urban history; folklife, literature, art, philosophy, or religion; popular culture, cultural theory, mass media; race studies; African American or women's/gender history; historic preservation; or some areas of the social and behavioral sciences. In

affiliation with the Smithsonian Institution, possible topics include aerospace history, decorative arts, ethnohistory, history of science, history of technology, industrial archaeology, material aspects of American civilization, and various fields in the history of art. Additional areas of study may be arranged within the University and in both the Library of Congress and the Smithsonian.

Research fields for the dissertation may be chosen from any of the above except those dealing with the culture of an area outside the United States.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit, additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 220 **Fundamentals of Feminist Theory (3)** Palmer
Same as WStu 220.
- 225 **History of Washington, D.C. (3)** Staff
The social history of Washington, from village to metropolis, with emphasis through field trips on the evolution of residential neighborhoods and related issues of historic preservation and conservation. Same as Hist 225.
- 231 **Seminar: Scope and Methods in American Studies (3)** Murphy, Mergen
Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American studies. (Fall)
- 232 **Cultural Theory and American Studies (3)** McAlister
Major issues in critical and cultural theory as they relate to American culture. Various interpretive approaches including discourse analysis, cultural studies, new historicism, anthropological theory, etc. Prerequisite: AmSt 231 or permission of instructor. (Spring, alternate years)
- 256 **Folklore Theory (3)** Vlach
An intellectual history of American folklore research; analysis of particular theories and methods. Same as Anth 296. (Spring)
- 257 **Seminar: American Folklife (3)** Vlach
Research and discussion on the traditional cultures of various geographical regions of the United States. Analysis of folk art, craft, and architecture; regional and ethnic identities. Same as Anth 297. (Fall)
- 258 **Vernacular Architecture (3)** Vlach
Examination of selected regional and ethnic traditions in American building. Survey and field techniques and use of documentary sources. (Spring, alternate years)
- 259 **Topics in American Folklife (3)** Staff
A seminar devoted to a variety of subjects related to folklore and folklife, such as public folklore policy, folk music, or ethnic folklore and culture. Specific topic to be determined by the interests of available faculty and the needs of the folklife program.
- 268-69 **Readings and Research in American Cultural History (3-3)** McAlister, Murphy
Studies in the cultural history of the United States, focusing on major historiographic debates and interventions. Topics include: cultural contact, colonialism, the public sphere, the rise and dissemination of mass media, consumer culture, systems of religious and political belief, gender relations, and racial formations. Same as Hist 268-69. (Alternate years)
- 270 **Theory and Practice of Public History (3)** Horton
Theoretical and practical dimensions of public history, as illustrated by recent controversies surrounding public exhibitions and debates on revisionist history as well as more traditional means of presenting the past in public forums. Same as Hist 270.
- 271-72 **Readings/Research Seminar: U.S. Social History (3-3)** Horton
AmSt 271: Readings seminar on American daily life, institutions, and intellectual and artistic achievements. AmSt 272: Research seminar. AmSt 271 is prerequisite to AmSt 272. Same as Hist 271-72.
- 273 **Readings on Women in American History (3)** Harrison
Same as Hist/WStu 273.

- 275 **The Politics of Historic Preservation** (3) Staff
Overview of the political issues, forces, events, and players that have shaped contemporary preservation practice, with an emphasis on public policy issues that have not been resolved and continue to confront preservation objectives. Prerequisite: Permission of instructor. (Spring)
- 276 **Economics of Preservation** (3) Wagner
Analysis of economic techniques and benefits used to encourage the retention and reuse of historic buildings and districts in the United States. Emphasis on revitalization of older commercial centers and the Mainstreet program. Prerequisite: Permission of instructor. (Spring)
- 277-78 **Historic Preservation: Principles and Methods** (3-3) Longstreth
The scope and purpose of the preservation movement in the United States, with focus on developments since the 1960s. Preservation theories, attitudes toward the past and toward design, the intent and impact of legislation, approaches to documentation, the concept of significance, and preservation as an instrument of change. Same as Hist 277-78. (Academic year)
- 280 **Field Methods in Architectural Documentation** (3) Ridout
In-depth thematic examination of cultural landscape, focusing on field techniques for recording, analysis, and interpretation of historic properties. Work at field sites is supplemented by lectures, discussion, and readings. (Fall)
- 282 **Seminar in American Architecture** (3) Longstreth
Advanced research problems addressing artistic, cultural, social, technical, and urbanistic aspects of American architecture in the 19th and 20th centuries. Topics vary. Prerequisite: AmSt 175 or 176 or equivalent, or permission of instructor. (Spring, alternate years)
- 286 **Interpretation in the Historic House Museum** (3) Stapp
Same as Educ 286.
- 289-90 **Seminar: Topics in American Studies** (3-3) Staff
Research problems selected by the instructor. Preparation in American cultural history or other area appropriate to the topic of the seminar.
- 294 **Archaeology Field/Laboratory Research** (3) Brooks
Same as Anth 284.
- 295 **Independent Study** (arr.) Staff
Limited to master's candidates. Written permission of instructor required.
- 299-300 **Thesis Research** (3-3) Staff
- 398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

Courses Offered in Affiliation with the Smithsonian Institution

Columbian College of Arts and Sciences is affiliated with the Smithsonian Institution's Program for Graduate Students in the History of American Civilization. The following courses are offered at the National Museum of American History and at the National Portrait Gallery by members of their staffs.

- 250 **American Material Culture** (3) Mergen, Mayo
Familiarization with the historical collections of the Smithsonian Institution and introduction to opportunities for research and publication based on historical objects. Required of all students in the master's and doctoral programs affiliated with the Smithsonian Institution. (Fall)
- 251 **Museum Research and Education** (3) Mayo
Supervised work and/or study under the direction of Smithsonian staff members and research associates—examples of topics are museum visitor behavior, costumes and furnishings, decorative arts, and photography as historical documentation. (Fall and spring)
- 252-53 **American Decorative Arts** (3-3) Carson
Concepts of visual recognition and evaluation of surviving domestic artifacts from the 17th, 18th, and 19th centuries, including those made of wood, clay, glass, metal, and cloth. AmSt 252 is prerequisite to AmSt 253. (Academic year)

- 284 Seminar: Studies in American Art and History (3)** Mergen
Joint offering of the American Studies Program and the Art Department. Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. May be repeated for credit.
- 285 Technology, Labor, and American Society (3)** Staff
Selected readings on the interrelations among technology, labor, and society in the United States.
- 394 Advanced Reading and Research (arr.)**
Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Smithsonian Institution. May be repeated for credit.
- 395 Dissertation Research (arr.)**
For Doctor of Philosophy candidates preparing dissertations significantly related to the material aspects of American civilization. Students work under curatorial supervision at the Smithsonian Institution. May be repeated for credit.

ANATOMY AND CELL BIOLOGY

The Department of Anatomy and Cell Biology offers the courses listed below in support of basic science programs offered by Columbian College of Arts and Sciences.

Departmental prerequisite: Faculty approval is required for all courses.

- 210 Gross Anatomy (5)** Slaby, Bohn
Regional dissections of adult cadaver supplemented with lectures and X-rays.
- 212 Neurobiology (3)** Peusner
An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory. Laboratory fee, \$25.
- 213 Human Microscopic Anatomy (4)** Staff
Microscopic structure of cells, tissues, and organs of the human body.
- 221-22 Special Topics in Anatomy and Cell Biology (1 to 3 each)** Staff
Presentations, discussions, and student-oriented projects that have as their theme a particular subspecialty of anatomy or cell biology.
- 252 Human Variation (1)** Ubelaker
Same as Anth 146.
- 253 Developmental Neurobiology (3)** Oakley
Molecular and cellular mechanisms of nervous system development. Topics include neural induction, pattern formation, fate specification, cell migration, axon guidance, target interactions, cell death, synapse formation and plasticity.
- 260 Developmental Genetics (2)** Moody
Recent advances in developmental genetics, presented from animal models and applied to human birth defects.
- 276 Advanced Studies in Anatomy (1)** Staff
Lectures and conferences on selected anatomical subspecialties—endocrinology, teratology, growth, and others. May be repeated for credit.
- 277 Special Topics in Neurobiology (1 to 3)** Staff
Selected topics regarding the structural and functional organization of the nervous system. May be repeated for credit.
- 279 Applied Regional Anatomy (1 to 3)** Bohn, Slaby
Regional dissection, assigned readings, discussion.

ANTHROPOLOGY

Professors A.S. Brooks (Chair), C.J. Allen, J.M. Vlach, D. Gow, B. Wood, J.C. Kuipers, B.D. Miller, D. Bell, R.R. Grinker

Assistant Professors A. Balkansky, S.C. Lubkemann

Adjunct Associate Professors C.R. Rose, P.J. Cressey

Professorial Lecturers D.H. Ubelaker, R. Potts, G. Teleki

Associate Professorial Lecturers D.W. von Endt, J. Love

Assistant Professorial Lecturers J.P. Homiak, J. Humphrey

Master of Arts in the field of anthropology—Prerequisite: a bachelor's degree; a major in anthropology is preferred but not mandatory. The undergraduate program should have

included courses above the introductory level in anthropological theory, social organization, linguistics, archaeology, and biological anthropology. Students with less background in anthropology may be admitted but may be required to take one or more undergraduate courses to make up deficiencies before beginning the degree program.

1. General degree—Required: the general requirements stated under Columbian College of Arts and Sciences. The minimum requirement consists of 24 credit hours of approved graduate course work, generally followed by a thesis (Anth 299–300). Under certain circumstances, however, the department may permit a program of study consisting of 36 credit hours of approved course work without a thesis. Anth 201–2 should be included in the program of study and completed during the first academic year of graduate work. In addition to Anth 201–2, students must pass at least one 3-hour course in each of the four fields of anthropology (biological, sociocultural, and linguistic anthropology and archaeology) with a grade of B or better. Students who have completed analogous upper-level undergraduate course work with a grade of B or better may request a waiver. For students with fewer than four undergraduate semesters of one major foreign language, a reading knowledge examination in a major foreign language must be passed before beginning the third semester of graduate work. All students must pass a general Master's Qualifying Examination and complete a field research project.

2. With a concentration in museum training—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study is the same as that described for the general degree, above, except that the minimum requirement consists of 36 credit hours of approved graduate course work and must include from 12 to 15 credit hours of work in museum-related courses, 6 credit hours of which may be in an internship. Museum training students may substitute for the foreign language reading examination an appropriate course in chemistry or photography, if approved by the department. No thesis is required, but students are expected to submit to the department at least one research paper of publishable quality on a museum-related topic. Students whose primary interest is in museum techniques, rather than anthropology, are advised to apply to the master's program in museum studies (see Museum Studies). A program in museum education is also available through the Graduate School of Education and Human Development.

3. With a concentration in folklife—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study is the same as that described for the general degree, except that 6 hours of folklife core courses (Anth 296 and 297) are also required.

4. With a concentration in development—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study is the same as that described above for the general degree, with the following exceptions: this is a 36-credit-hour nonthesis program, including 9 hours in development anthropology (chosen from Anth 220, 221, 222, 223), 18–21 hours in other anthropology courses, and at least one graduate-level economics course. In some circumstances a thesis may be allowed. The program is designed to improve the student's understanding of development problems, such as economic change, population, health, education, migration, and ecology, within an anthropological framework. Internships at public and private development agencies in the Washington area are encouraged. The Elliott School of International Affairs offers a program in international development studies, with a disciplinary specialization in anthropology.

Master of Science and Doctor of Philosophy in the field of hominid paleobiology—see Hominid Paleobiology.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201–2 Proseminar in Anthropology (3–3)

Kuipers, Lieberman, and Staff

Analytical approaches and analytical practice in anthropology. Anth 201: data collection and analysis in all fields of anthropology; Anth 202: ethnographic methods. [Academic year]

213 Mesoamerican Field Program (3 or 6)

Balkansky

Field and/or laboratory techniques and interpretation. Topics may include excavation methods, recording, photography, conservation, stratigraphy, environmental reconstruction, typology, use-wear analysis, spatial analysis, faunal analysis, provenance studies, and dating. May be repeated for credit. (Summer)

- 214 **Paleoanthropological Field Program (3 or 6)** Brooks
Intensive course on field research in paleoanthropology, including excavation methods, identification and analysis of materials, paleoecology, archaeology, and human anatomy. Conducted at selected sites in Eurasia, Africa, or Australia. Visits to comparative sites and collections in the region. (Summer)
- 220 **The Anthropology of Development (3)** Miller, Gow
Theoretical perspectives that distinguish the contribution of anthropology to understanding processes of change in the Third World. Focus on health, population, environment, gender, and tourism issues. The role of anthropology in planning and implementing projects and policy. (Fall)
- 221 **Key Variables in Development (3)** Miller and Staff
Major factors required for understanding planned and unplanned social change in the areas of population, education, land reform, women's status, technology, forestry, nutrition, health care, and migration and resettlement. Study of the major variables and processes in each area to aid in successful planning, implementation, and evaluation of projects. (Spring, alternate years)
- 222 **Issues in Development (3)** Miller, Gow, and Staff
Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 223 **Research Methods in Development Anthropology (3)** Miller, Gow
Anthropologists' roles in multidisciplinary teams, including research-related activities, such as feasibility studies, social soundness analysis, and evaluations. Innovative research techniques, such as interactive data gathering, team survey methods, and rapid rural appraisal. Admission by permission of instructor. (Spring)
- 224 **Internship in Development Anthropology (3)** Miller, Gow
Supervised participation in a selected development agency or other relevant organization. Opportunity to observe agency procedures and gain practical experience. Admission by permission of instructor or department chair. (Fall, spring, and summer)
- 230 **Anthropology in the Museum (3)** Humphrey
Anthropological materials (in the broadest sense), exhibits, and museums. Topics include museum anthropology, collections, research, interpretation, and education, with a focus on the practical problems of developing an anthropological exhibit hall.
- 231 **Museums and the Public: Exhibiting Culture (3)** Staff
Study of the real world of public exhibition through visits to a variety of museums in the Washington-Baltimore area and the critical examination of their exhibits. Transportation fee charged. (Summer)
- 232 **Introduction to Conservation (3)** Rose
Method and theory of conservation, including fine arts, ethnographic, archaeological, and monuments conservation; handling, restoration, preservation, storage, and display of museum specimens; materials and environmental reactions of ethnographic objects. Same as AH 232. (Fall)
- 233 **Preventive Conservation Techniques (3)** Rose
Preventive conservation of materials: monitoring environmental conditions, examining objects and documenting their state, and identifying sources of deterioration. Students conduct tests, evaluate exhibition and storage areas, and help to improve museum conditions. Prerequisite: Anth/AH 232. Same as AH 233. (Spring)
- 234 **Problems in Conservation (3)** Rose
Individual conservation projects to determine composition, construction, decomposition of materials, and possible stabilization techniques. Conservation laboratory experience. Same as AH 234. Prerequisite or concurrent registration: AH or Anth 232. (Fall)
- 235 **Advanced Conservation Techniques (3)** von Endt
Physical structure, molecular biology, and chemistry of ethnographic materials. Chemistry and physics underlying techniques used to conserve these materials. Same as AH 235. Prerequisite: AH or Anth 233, Chem 50, and permission of instructor. Laboratory fee, \$25. (Fall)
- 236 **Internship in Museum Anthropology (1 to 6)** Staff
Supervised individual research and/or field work at the Smithsonian Institution or other area museums, arranged in consultation with the museum and the

- Anthropology Department. Admission by arrangement with the department chair or museum training advisor. May be repeated for credit up to a maximum of 6 credits. (Fall and spring)
- 247 **Paleoanthropology** (3) Brooks, Wood
Survey of current research in hominid and hominoid evolution, focusing on the integrated nature of the field. Contributions from the geological and biological sciences will be stressed, together with innovative geochemical techniques for establishing chronological sequences. Prerequisite: Anth 147 or BiSc 150 or equivalent. (Spring)
- 249 **Topics in Biological Anthropology** (3) Staff
Topic announced in the *Schedule of Classes*. Instructors will be drawn from GW faculty and Smithsonian Institution staff. May be repeated for credit if topic varies.
- 250 **Nationalism and Ethnicity** (3) Grinker
Major theoretical and ethnographic issues in the study of nationalism world-wide. Explores how ethnic groups emerge in colonial and contemporary plural societies and how states attempt to integrate ethnic groups into nations. (Fall, alternate years)
- 251 **Anthropology and Contemporary Problems** (3) Staff
Exploration of anthropological perspectives on a current issue, such as refugees, ethnic violence, national mythologies, and women's health in developing countries. Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 254 **Medical Anthropology** (3) Miller
Concepts of medical anthropology, including the cultural construction of illness, the somatic expression of distress, and ethnopsychiatry; "critical" versus "conventional" medical anthropology. (Fall)
- 257 **Gender and Sexuality** (3) Bell
Study of new theoretical and methodological approaches developed in the anthropology of gender. Topics include postcolonialism, sexuality, and literary representations of gender. (Fall, odd years)
- 258 **Anthropology of Art, Aesthetics, and Symbolism** (3) Allen
Anthropological approaches to aesthetic problems and theories of symbolism in the context of ethnographic materials. (Fall)
- 259 **Topics in Sociocultural Anthropology** (3) Allen and Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit if the topic varies.
- 269 **Topics in Linguistic Anthropology** (3) Kuipers and Staff
Topic announced in the *Schedule of Classes*. May be repeated for credit if the topic varies.
- 272 **Anthropology of Latin America** (3) Allen and Staff
Intensive study of a selected topic in the anthropology of Central and/or South America. Topic to be announced.
- 282 **Advanced Archaeology—New World Prehistory** (3) Balkansky and Staff
Current archaeological problems relating to the origin and development of aboriginal cultures. Specific topic to be announced in the *Schedule of Classes*. May be repeated for credit.
- 283 **Old World Anthropology—Physical Anthropology and Archaeology** (3) Brooks and Staff
Current problems in relation to materials from the Old World. Specific area to be announced in the *Schedule of Classes*. (Spring)
- 284 **Archaeology Field/Laboratory Research** (3) Cressey, Brooks
Same as AmSt 294. Field and/or laboratory techniques and interpretation. Topics may include excavation methods, recording, photography, conservation, stratigraphy, environmental reconstruction, typology, ceramic analysis, use-wear analysis, spatial analysis, faunal analysis, provenance studies, and dating. May be repeated for credit. Laboratory fee, \$25. (Spring, odd years, and summer)
- 286 **Technology** (3) Staff
Cross-cultural examination of the form, function, meaning, and use of material culture and the behavior patterns involved in its production. Topic announced in the *Schedule of Classes*. (Spring, alternate years)
- 289 **Topics in Archaeology** (3) Balkansky and Staff
Major issues related to the theory and practice of archaeology. Topic announced in the *Schedule of Classes*.

- 295 **Research** (arr.) Staff
May be repeated for credit.
- 296 **Folklore Theory** (3) Vlach
An intellectual history of American folklore research; analysis of particular theories and methods. Same as AmSt 256. (Spring)
- 297 **Seminar: American Folklife** (3) Vlach
The materials of American folk culture, concentrating on folk architecture, crafts, and art. Major organizing themes are regionalism and the use of objects as indicators of cultural intention. Same as AmSt 257. (Fall)
- 299-300 **Thesis Research** (3-3) Staff

APPLIED SCIENCE

Interdepartmental course offerings in the School of Engineering and Applied Science.

- 211 **Analytical Methods in Engineering I** (3) Whitesides, Haque
Engineering applications of the theory of complex variables: contour integration, conformal mapping, inversion integral, and boundary-value problems. Prerequisite: approval of department. (Fall)
- 212 **Analytical Methods in Engineering II** (3) Mavriplis, Haque
Algebraic methods appropriate to the solution of engineering computational problems: linear vector spaces, matrices, systems of linear equations, eigenvalues and eigenvectors, quadratic forms. Prerequisite: approval of department. (Spring)
- 213 **Analytical Methods in Engineering III** (3) Haque, Whitesides
Analytical techniques for solution of boundary-initial-value problems in engineering: wave propagation, diffusion processes, and potential distributions. Prerequisite: approval of department. (Fall)
- 214 **Analytical Methods in Engineering IV** (3) Haque
Introduction to variational methods in engineering: Ritz and Galerkin approximation methods of boundary-value problems, aspects of linear integral equations arising from engineering analysis. Prerequisite: approval of department. (Spring, even years)
- 215 **Analytical Methods in Engineering V** (3) Whitesides, Haque
Advanced methods of solution of boundary-initial-value problems in engineering: characteristics, wave propagation, and Green's functions. Prerequisite: ApSc 213. (Fall, odd years)
- 216 **Special Topics in Engineering Analysis** (3) Whitesides, Haque
Selected topics, such as perturbation techniques applied to approximate solution of nonlinear boundary and initial-value problems in engineering; application of singular integral equations in problems of mechanics. Prerequisite: approval of department. (As arranged)

ART

See Fine Arts and Art History.

ART THERAPY

Assistant Professors B. Barthell, A. Mills (*Director*)

Adjunct Associate Professors E. Kramer, A. Di Maria

Adjunct Assistant Professor B. Sobol

Lecturers P. Howie, D. Brancheau, T. Tripp, C. Doby-Copeland

Clinical Instructors T. Council, E. Glassman, E. Parks, L. Diamond-Raab, E. Knight, S. Thomas

Master of Arts in the field of art therapy—Prerequisite: a bachelor's degree, evidence of significant training and/or experience in art, including painting, drawing, and clay modeling, course work in the behavioral and/or social sciences, including personality theory, abnormal psychology, and child psychology.

Required: the general requirements stated under Columbian College of Arts and Sciences and successful completion of 45 credit hours of graduate course work. At least 24 credit hours must be in art therapy and must include ArTh 201, 203, 205-6 or 207 and 208, 224-25, 283-84, and 293-94.

Fields of emphasis: adult art therapy, family art therapy, child art therapy, and research. Students wishing to extend their training to the doctoral level are encouraged to apply to the Doctor of Psychology program. See Professional Psychology.

A certificate program is available to those who have earned or are currently enrolled in a graduate program in a related field.

Five-Year Bachelor of Arts/Master of Arts in the field of art therapy—See the Undergraduate Programs Bulletin.

Note: The following courses are open to non-art therapy students with permission of the instructor or program director: ArTh 202, 204, 205–6, 207, 208, 211, 220, 228, 275, 280; 289

201 Introduction to Art Therapy (3)

Brancheau

Overview of theoretical approaches in art therapy, based on recognized theories of personality. Developmental stages of artwork; normal and abnormal personality characteristics; defense mechanisms in artwork. Ethical considerations and standards of practice. Open only to art therapy students. (Fall)

202 Case Studies (3)

Di Maria

Organization of case material for presentation in various clinical settings. Videotaping of presentations, with peer and instructor feedback. Case management procedures. Psychiatric and medical terminology used in case documentation. Writing a formal case study and a variety of progress notes. (Spring)

203 Technique of Art Therapy (3)

Barthell

Discussion of art therapy approaches involving understanding of abnormal behavior and the needs of patients with diverse diagnoses. Theories of counseling and psychotherapy, diagnostic categories, and clinical application of counseling and art therapy techniques. Case presentation and paper. Open only to art therapy students. (Fall)

204 Psychodynamic Processes (3)

Kramer, Howie

Concepts of instinctual drives, ego development, mechanisms of defense, sublimation, transference and countertransference, maturation and regression applied to work with children, adults, families, and groups. (Spring)

205–6 Principles and Practice of Art Therapy with Families (3–3)

Sobol, Howie

Principles of work with families, including various theoretical approaches to the family system, cultural issues, and ethical considerations. The use of art techniques for evaluation of family dynamics. Observation and conduct of family art evaluations in clinical settings. (Fall and spring)

207 Principles and Practice of Art Therapy with Children (3)

Di Maria

Practical and theoretical considerations involved in treating children, with focus on child development (including the development of artistic expression), methods of evaluation (including those using art materials), psychodynamic processes, and the array of issues arising in individual and group work. (Spring)

208 Principles and Practice of Art Therapy with Adolescents (3)

Brancheau

Practical and theoretical considerations involved in treating adolescents in clinical and educational settings, with focus on stages of adolescent and artistic development. Assessment and treatment issues integrating the use of art techniques specifically designed for this population. (Spring)

211 Survey of Art Therapy (3)

Staff

Use of visual arts to enhance personal development; history, theories, range of practice in art therapy. Illustrated lectures, reading, discussion, studio work. Not intended for art therapy degree candidates. Open to advanced undergraduates with permission of instructor. (Fall)

220 Research Methods (3)

Mills

Research principles, design, and methodology. Basic statistics, ethical and legal considerations, and relevant research models. Individual art therapy pilot studies are designed and executed. (Spring)

224–25 Therapeutic Process (3–3)

Barthell

Theoretical and clinical dimensions of counseling explored through study of current research in therapy, reading and discussion of multicultural elements affecting the therapeutic process, and videotaping on site and in the classroom. Individual, group, and systems issues affecting the therapeutic encounter. Open only to art therapy students. (ArTh 224: spring; ArTh 225: fall)

- 228 **Art and Diagnosis (3)** Tripp
This course reviews the *Diagnostic and Statistical Manual* as well as relevant literature pertaining to psychiatric diagnosis. Cultural and environmental influences on diagnostic categorization. Viewing art productions by specific diagnostic populations. Art therapy research related to diagnosis. (Fall)
- 275 **Group Process (3)** Tripp
Group psychotherapy theory, techniques, and practices studied through lectures, discussion, and participation in a group experience. Theories relating to developmental stages, role assumption, leadership style and its effect on the group, and ethical and cultural issues particular to group therapy. The relationship of art to the group process. (Summer)
- 280 **Assessment Procedures (3)** Mills
Assets, limitations, ethics, and procedures involved in psychological assessment. Wechsler, Bender, Rorschach, Thematic Apperception Tests, and projective drawing tests. Administration and interpretation of standardized assessments in the art therapy field, to develop an ability to analyze form and content of pictorial and sculptural work for clinical and diagnostic purposes. (Fall)
- 283-84 **Practicum in Art Therapy (1-2)** Staff
The sequence of ArTh 283-84 and 293-94 requires a minimum of 1100 hours of clinical fieldwork in a professional setting (psychiatric and medical hospitals, community mental health centers, geriatric facilities, residential treatment settings, and schools). On-site individual supervision and group supervision by departmental staff. Open only to art therapy students.
- 285 **Special Projects in Art Therapy (arr.)** Staff
Individual work based on research. Empirical, clinical, and library research may be undertaken, as well as the development of new procedures. Details to be worked out with each student. May be repeated for credit with advisor's approval. Open only to art therapy students. (Fall and spring)
- 289 **Special Topics (1 to 3)** Staff
Connections between art therapy and other disciplines; new developments in the field. May be repeated for credit with approval of advisor. Past topics have included "Honoring Diversity" and "The Artist as Therapist."
- 293-94 **Practicum in Art Therapy (2-1)** Staff
Continuation of ArTh 283-84. Open only to art therapy students.

ASIAN STUDIES

Program Committee: M. Mochizuki (*Director*), A. Bowie, B. Dickson, Y.-K. Kim-Renaud, E. McCord, D. Yang

Master of Arts in the field of Asian studies—The Elliott School of International Affairs offers a multidisciplinary program leading to the Master of Arts in the field of Asian studies.

Prerequisite: the admission requirements stated under the Elliott School of International Affairs and a bachelor's degree in a related field. Entering students who have not completed undergraduate course work in modern Chinese and Japanese history must take equivalent course work at the beginning of their program.

Required: the general requirements stated under the Elliott School of International Affairs. The program requires a minimum of 40 credit hours, with a thesis or non-thesis option. Students electing the thesis option will complete 6 credit hours of thesis research. Students are required to organize their course work into at least three fields and successfully complete a capstone policy course during their last spring semester in residence. Each student's program of study must include course work on more than one Asian country, as well as course work in a minimum of three of the following disciplines: economics, history, literature, political science, and sociology. Students should consult the program guidelines available from the Elliott School about specific courses in these fields of study. Students may also choose a non-Asia-related field (e.g., international business) after approval in advance by the program director. Students must pass a capstone course and three 1-credit skills-based courses. More details are provided in the program guidelines available in the Elliott School.

Students must demonstrate an oral and reading knowledge of Chinese, Japanese, or another approved Asian language by passing a proficiency examination during their final 18 hours in residence. Six hours of language course credit may apply toward degree requirements.

BIOCHEMISTRY AND MOLECULAR BIOLOGY

Professors J.M. Bailey, A.L. Goldstein (*Chair*), L.L. Gallo, A. Kumar, G. Walker, J.Y. Vanderhoek

Associate Professors V. Hu, P. Berg, F. Kashanchi, T. McCaffrey

Master of Science in the field of biochemistry—Prerequisite: a bachelor's degree. The undergraduate program must have included the following courses, or equivalent: BiSc 11–12; Chem 11–12, 22, 151–52, 153–54; Phvs 1, 2.

Required: the general requirements stated under Columbian College of Arts and Sciences, including Bioc 221–22, 223 or 224, 234; BiSc 274 or 275; and the Comprehensive Examination. Students may choose a 30-credit thesis option or a 36-credit nonthesis option.

Master of Science in the field of genomics and bioinformatics—This new degree program is offered by Columbian College of Arts and Sciences in cooperation with the School of Medicine and Health Sciences and the School of Engineering and Applied Science. The program is under development as this Bulletin is being prepared; please check with the Department of Biochemistry and Molecular Biology or the Department of Microbiology and Tropical Medicine for program requirements.

Doctor of Philosophy in the field of biochemistry—Required: the general requirements stated under Columbian College of Arts and Sciences, including the biomedical sciences core curriculum, Bioc 223, 225, 227, 234, 250, and the General Examination.

Research fields: endocrinology—thymosins, signaling pathways, eicosanoids; viral gene regulation; antiviral chemotherapy; immunology—immunochemistry, viral gene trans-activation; lipids and membranes—essential fatty acids, membrane biochemistry, complex lipids, cholesterol; radiation biology—carcinogenesis, apoptosis; molecular biology of cancer—breast cancer, leukemia, homeobox genes, genomics and proteomics—vascular biology, gene array technology, lipoproteins, atherosclerosis, HIV-1 and other human retroviruses.

221–22 General Biochemistry (4–4)

Gallo and Staff

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Prerequisite: Chem 152, 154. (Academic year)

223 Biochemical Techniques (3)

Vanderhoek

Lectures cover basic laboratory techniques used in contemporary biochemical and molecular biological research. (Fall)

224 Biochemical Techniques Laboratory (3)

Vanderhoek

Common laboratory techniques used in life science laboratories to separate and characterize macromolecules, including chromatography, gel electrophoresis, immunoassays, spectroscopy, and centrifugation. Corequisite: Bioc 221. Laboratory fee, \$75. (Fall)

225 Metabolism (4)

Staff

Metabolic pathways and integration of metabolic processes. Limited to Ph.D. students in the Institute for Biomedical Sciences.

227 Biochemistry Seminar (1)

Staff

Current literature in biochemistry. Limited to graduate students in the department. May be repeated for credit. (Fall and spring)

230 Topics in Protein Chemistry and Enzymology (2)

Hu and Staff

Directed readings in various areas of enzymology. Enrollment limited to graduate students in the department. May be repeated for credit. Prerequisite: Bioc 234.

234 Structure and Function of Proteins and Enzymes (3)

Hu and Staff

Structure–function relationships of proteins, enzyme kinetics, regulation and reaction mechanisms, and other special topics. Prerequisite: Bioc 221. (Spring)

235 Current Topics in Bioenergetics (1 or 2)

Staff

Directed readings in various areas of bioenergetics. Enrollment limited to graduate students in the department. May be repeated for credit. Prerequisite: Bioc 222.

236–37 Fundamentals of Genomics and Proteomics (2–2)

McCaffrey and Staff

Genomic theories, methods, and data analysis including bioinformatics and database mining. Proteomic methods, including two-dimensional gels, image

- analysis, and protein identification. Same as Micr 236-37. Prerequisite: Bioc 221-22 or BmSc 210, 211; Bioc/Micr 236 is prerequisite to Bioc/Micr 237.
- 240 **Nutrition (2)** Walker and Staff
Content includes discussion of RDA, nitrogen balance, vitamins and minerals, diets, and other special topics. Prerequisite: Bioc 201 or 221-22. (Spring)
- 250 **Molecular Biology (3)** Kumar and Staff
Content includes the organization and replication of genetic material, transcriptional and translational machinery, regulation of eukaryotic gene expression, and other special topics. Prerequisite: Bioc 201 or 221-22. (Fall)
- 251 **Current Topics in Molecular Biology (1 or 2)** Kumar and Staff
Directed readings in the area of molecular biology. May be repeated for credit. Enrollment limited to graduate students in the department; others may enroll with approval of instructor. Prerequisite: Bioc 250. (Spring)
- 252 **Biochemical and Molecular Aspects of Selected Diseases (2)** Kumar and Staff
Emphasis on the biochemical and molecular aspects of selected diseases. The format will be of a tutorial type, including presentations of material by students. (Spring, odd years)
- 254 **Fundamentals of Molecular Biology (3)** Berg and Staff
An intermediate-level molecular biology survey course. Prerequisite: Bioc 221 or BmSc 211.
- 260 **Biochemistry of Lipids and Membranes (2)** Vanderhoek
Biochemistry, structure, and function of various lipid classes, membranes, and receptors. Prerequisite: Bioc 221-22. (Spring, even years)
- 261 **Current Topics in Lipids (1 or 2)** Gallo, Vanderhoek, and Staff
Directed readings in the area of lipid biochemistry. May be repeated for credit. Enrollment limited to graduate students in the department.
- 262 **Lipoproteins (2)** Gallo
Composition, synthesis, and metabolism of lipoproteins in normal and dyslipoproteinemic subjects. Prerequisite: Bioc 221-22. (Spring, odd years)
- 266 **Cellular Biology (3)** Vanderhoek and Staff
Structure and function of cellular membranes, cytoskeleton, subcellular organelles, cellular bioenergetics, and intercellular interactions. Prerequisite: Bioc 221-22. (Spring)
- 270 **Biochemistry and Cell Biology of the Immune Response (2)** Goldstein and Staff
Biochemical aspects of the immune response at the molecular and cellular level. Modern experimental approaches to immunology and cell biology. Prerequisite: Bioc 221-22 and Micr 229, or permission of instructor. (Spring)
- 271 **Current Topics in Immunology (1 or 2)** Goldstein and Staff
Directed readings in the area of biochemical immunology. May be repeated for credit. Enrollment limited to graduate students in the department. Prerequisite: Bioc 270.
- 280 **Neurochemistry (2)** Moody and Staff
Content includes molecular structure and function of nerve tissue; intra- and interneuronal communication mechanisms; biochemistry of various brain dysfunctions; and other special topics. Prerequisite: Bioc 201 or 221-22. (Fall)
- 281 **Current Topics in Neurochemistry (1 or 2)** Moody and Staff
Directed readings in neurochemistry. May be repeated for credit. Enrollment limited to graduate students in the department. Prerequisite: Bioc 280.
- 295 **Research (arr.)** Staff
Participation in a project under investigation in the department or one in a related field suggested by the student and approved by the staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)
- 298 **Advanced Reading (1 to 6)** Staff
Limited to master's degree candidates. May be repeated for credit to a maximum of 6 hours.
- 299-300 **Thesis Research (3-3)** Staff
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

BIOLOGICAL SCIENCES

Professors R.K. Packer, R. Donaldson (*Chair*), J.R. Burns, D.L. Lipscomb, R.E. Knowlton
Associate Professors H. Merchant, D.E. Johnson, R.M. Brown, J.M. Clark, M.W. Allard,
 L.C. Smith, F.J. Turano
Assistant Professors E.F. Wells, D.W. Morris, G. Hormiga, P.S. Herendeen, P. Hernandez
Adjunct Professors L.R. Parenti, S.H. Weitzman
Professorial Lecturer D. Goldman

Master of Science in the field of biological sciences—Prerequisite: a bachelor's degree with a major in biological sciences or an equivalent degree. The undergraduate program must have included the following courses, or equivalent: Math 31; Phys 1 and 2, or 21 and 22; Stat 91 or 127.

Required: the general requirements stated under Columbian College of Arts and Sciences. The minimum requirement consists of 24 credit hours of approved course work plus a thesis (equivalent to 6 credits). With the permission of the department, a student may elect a program of study consisting of 36 credit hours of approved course work without a thesis.

Master of Arts in the field of museum studies, with specialization in the biological sciences, see Museum Studies.

Doctor of Philosophy in the field of biological sciences—Required: the general requirements stated under Columbian College of Arts and Sciences, plus satisfactory completion of a Preliminary Examination and the General Examination in at least three areas of biology. The program of study and fields of study are determined in consultation with an advisory committee appointed for each candidate.

Major Research Areas: cell, molecular, and developmental biology; systematics and evolution; ecology.

Master of Science and Doctor of Philosophy in the field of hominid paleobiology, see Hominid Paleobiology.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 204 Seminar: Invertebrate Zoology (3)** Knowlton
 Review of selected topics in physiology, development, and ecology of invertebrate animals, including reports on original publications. May be repeated for credit. Prerequisite: BiSc 130 or equivalent. (Fall, even years)
- 207 Seminar: Current Topics in Systematic Biology (1 or 2)** Allard, Clark, Hormiga, Lipscomb
 Prerequisite: BiSc 210. (Fall and spring)
- 208 Bioenergetics (3 or 4)** Merchant
 Study of energy fixation and transfer in ecosystems and of their role in behavior, evolution, population dynamics, and species interactions. Students enrolling for 4 credits will devote one additional class meeting per week to an investigation of the nature and methods of science. Prerequisite: BiSc 154 or permission of the instructor. (Fall, odd years)
- 209 Seminar: Principles and Mechanisms of Organic Evolution (3)** Lipscomb
 Current problems and issues in evolution, speciation, macroevolution, biogeography, and topics of special interest to participants. Prerequisite: BiSc 150 or equivalent. (Spring)
- 210 Phylogenetic Systematics (4)** Allard, Hormiga
 A rigorous and up-to-date treatment of the theory and methods of systematics, including phylogenetic inference and its applications in evolutionary biology. Laboratory fee, \$40. Prerequisite: BiSc 150 or equivalent. (Fall)
- 211 Biogeography and Coevolution (3)** Herendeen
 Survey of methods and techniques used in biogeography. Geological and paleontological aspects of biogeography: large-scale biogeographic patterns; co-

- evolution. Prerequisite: BiSc 151 or 152 or permission of the instructor. (Fall, odd years)
- 213 **Descriptive Systematics: Documenting Biodiversity** (3) Hormiga
Study of those aspects of systematic biology concerned with description and inventory of biodiversity. Prerequisite: BiSc 210. (Fall, odd years)
- 214 **The Phylogenetic Basis of Comparative Biology** (3) Hormiga
The use of phylogenetic hypotheses to study questions in evolutionary biology and ecology. Prerequisite: BiSc 210; Stat 127 or equivalent. (Fall, even years)
- 215 **Vertebrate Phylogeny** (4) Clark
Lecture (3 hours), laboratory and field (2 hours). A survey of vertebrate diversity, emphasizing evolutionary relationships and adaptations of the major groups. Prerequisite: BiSc 150 or equivalent; BiSc 132 recommended. (Spring, odd years)
- 216 **Morphological Systematics** (4) Clark
Lecture (3 hours) and laboratory (2 hours). Methods of studying organismal morphology as a means of inferring phylogeny, emphasizing the concept of homology. Laboratory includes techniques of observing, measuring, and imaging morphology in systematic biology, including morphometric methods. Laboratory fee, \$40. Prerequisite: BiSc 210 or equivalent. (Spring)
- 218 **Immune Systems in Plants and Animals** (3) Smith
Defense functions in higher plants and immune mechanisms in sponges through lower vertebrates, with comparisons to immune responses in mammals. Prerequisite: BiSc 102. (Spring)
- 221 **Variation and Evolution in Plants** (3) Wells
Biosystematics of plants, covering the literature, concepts, and methodology of breeding systems, cytogenetics, speciation, and conservation. Prerequisite: BiSc 107 or 140 or 150. (Spring, even years)
- 222 **Diversity and History of Plants** (4) Herendeen
Lecture (3 hours), laboratory (3 hours). A detailed investigation of the diversity, phylogeny, morphology, and fossil history of plants for advanced undergraduates and graduate students. Prerequisite: BiSc 140 or 150 or 151 or equivalent. (Fall, even years)
- 223 **Angiosperm Diversity and Phylogeny** (4) Herendeen
Lecture (2 hours) and laboratory (2 hours scheduled, 2 hours independent). A detailed investigation of the diversity and phylogeny of flowering plants. Lectures focus on morphological, anatomical, and molecular evidence for relationships within angiosperms. Laboratories focus on structural characteristics of families and higher groups. (Fall, odd years)
- 224 **Molecular Evolution** (3) Allard
A review of the diversity, organization, and evolution of genomes, with an emphasis on interpreting this variation in a phylogenetic perspective. All major structures of molecules, including coding and non-coding regions. Prerequisite: BiSc 107 and 150; BiSc 210, 227, 228 are recommended but not required. (Fall, even years)
- 225 **Molecular Phylogenetics** (4) Allard
Lecture (3 hours), computer laboratory (2 hours). Review of molecular phylogenetic methods including data recovery, alignment, weighting, character optimization, and phylogenetic inference methods. Laboratory fee, \$40. Prerequisite: BiSc 107, 150 and 210 or equivalent. (Spring)
- 226 **Mammalian Evolution** (3) Allard
A review of mammalian diversity explored in a phylogenetic framework. Natural history, identification of mammals, and their numerous evolutionary adaptations (e.g., evolution of eusociality, evolution of flight). Prerequisite: BiSc 150 or equivalent; recommended: BiSc 210. (Fall, odd years)
- 227 **Seminar: Genetics** (3) Johnson
Review of selected topics in genetics, with emphasis on current literature; topics of special interest to participants encouraged. May be repeated for credit. Prerequisite: BiSc 107 or equivalent. (Fall, odd years)
- 228 **Population Genetics** (3) Johnson
Origin, maintenance, and possible significance of genetic variation in populations. Selection, genetic drift, microevolution of species, and speciation are emphasized. Both theoretical and applied aspects of population genetics are discussed. Prerequisite: BiSc 107 or equivalent. (Fall, even years)

- 229 Cytogenetics (3)** Staff
 Behavior of chromosomes in mitosis and meiosis as a basis for the transmission of genes from one generation to the next through reproduction and the influence of cytogenetic processes on the mechanisms of evolution. Prerequisite: BiSc 102 or 103 and 107 or equivalent. (Fall)
- 230 Human Genetics (3)** Staff
 Genetic mechanisms of transmission and expression of human traits, with emphasis on biochemical and cytogenetic aspects. Prerequisite: BiSc 107 or equivalent; previous course work in cell biology or cell biochemistry strongly recommended. (Spring)
- 242 Advanced Plant Ecology (3)** Wells
 Study of selected topics in adaptive plant strategies and North American plant communities, concentrating on invasive alien plant species. Prerequisite: BiSc 155 or 156. (Spring, odd years)
- 243 Seminar: Ecology (3)** Merchant
 In-depth study of selected topics, including reports on original publications. May be repeated for credit. Prerequisite: BiSc 154 or equivalent. (Spring, even years)
- 249 Seminar: Developmental Biology (3)** Brown
 Discussion and reports on recent research on the molecular genetic and biochemical aspects of animal development. Prerequisite: one course in developmental biology, cell biology, biochemistry, or molecular genetics. May be repeated for credit. (Spring, even years)
- 250 Signal Transduction (3)** Turano
 Advanced topics of intra- and intercellular signaling; model signal transduction pathways. Prerequisite: BiSc 103 or Bioc 101 or Chem 163. (Spring)
- 252 Seminar: Neurobiology (3)** Staff
 Study of current publications in functional neurobiology. May be repeated for credit with instructor's permission. (Spring, odd years)
- 274 Gene Regulation and Genetic Engineering (3)** Morris
 The control of gene expression as illustrated by several prokaryotic and eukaryotic model systems: discussions of recombinant DNA techniques. Prerequisite: BiSc 107. (Spring)
- 275 Introduction to Recombinant DNA Techniques (3)** Staff
 Lecture, 1 hour; laboratory, 4 hours. Basic techniques of genetic manipulation: cloning of genes, transformation of bacteria, PCR procedures, DNA sequencing, and other techniques. Prerequisite: BiSc 102 or 107 or 137 or equivalent and permission of instructor. Laboratory fee, \$40. (Fall, even years)
- 295 Research (arr.)** Staff
 Investigation of special problems. May be repeated for credit.
- 299-300 Thesis Research (3-3)** Staff
- 398 Advanced Reading and Research (arr.)** Staff
 Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
 Limited to Doctor of Philosophy candidates. May be repeated for credit.

BIOMEDICAL SCIENCES

Committee on Biomedical Sciences

S. Ladisch (*Director*), V. Chiappinelli, R.P. Donaldson, C. Holland, S. Moody, F. Noonan

The interdisciplinary doctoral programs in the biomedical sciences are organized within the Institute for Biomedical Sciences. The first full year of study toward the Ph.D. programs in the fields of biochemistry, genetics, immunology, molecular and cellular oncology, neuroscience, and pharmacology is offered through the Institute. Faculty are drawn from GW's Columbian College of Arts and Sciences and School of Medicine and Health Sciences, including scientists from the Children's Research Institute of Children's National Medical Center and the Holland Laboratory of the American Red Cross.

The biomedical sciences core curriculum consists of BmSc 210, 211, 212, and 216-18; 3 credit hours of BmSc 215, one course chosen from BmSc 213 or 214 or Bioc 225; Path 219; and (if required) BiSc 122, Human Physiology.

Students are admitted directly into the Institute for Biomedical Sciences through Columbian College of Arts and Sciences. At the end of the first year of study, each student

selects one of the six Ph.D. fields and completes remaining degree requirements in the appropriate department or program. See Biochemistry and Molecular Biology, Genetics, Molecular and Cellular Oncology, Neuroscience, and Pharmacology.

- 210 **Macromolecular Interactions: Proteins** (2 or 4) Donaldson
Proteins structure and function, introduction to metabolic processes. Registration with permission of instructor.
- 211 **Macromolecular Interactions: Nucleic Acids and Information Processing** (2 or 4) Patierno
Structure and function of nucleic acids, organization of the genome, and regulation of protein synthesis and processing. Registration with permission of instructor.
- 212 **Cell Biology** (2 or 4) Stepp
Structure and functions of cells and tissues, techniques used for the analysis of cell function (image analysis, microscopy). Registration with permission of instructor.
- 213 **Immunology** (2) Shi
Survey of immunology with an emphasis on issues of importance to biomedical research. Registration with permission of instructor.
- 214 **Neurobiology** (2) Chiappinelli
An overview of current topics in neuroscience, with emphasis on research areas represented within the Neuroscience Program. Registration with permission of instructor.
- 215 **Lab Rotations** (1) Berg
For Ph.D. students enrolled in the Institute for Biomedical Sciences. Laboratory training in advanced techniques in biomedical sciences research practices. May be repeated for credit.
- 216-18 **Career Skills for the Biomedical Sciences** (1-1-1) Cassidy, Koering, Johnson
Scientific writing, presentation skills, and seminar planning. Developing roles in the field: research in varying settings, policy and program planning, grants administration, and the biotechnology issues within intellectual property law. Ethical issues related to the conduct of research, animal use, and human subject participation. The design of a successful grant proposal.

BIOSTATISTICS

Columbian College of Arts and Sciences offers the degrees of Master of Science and Doctor of Philosophy in the field of biostatistics. The School of Public Health and Health Services collaborates with the Department of Statistics and the Biostatistics Center in these degree programs. For the Public Health courses listed below, please contact the School of Public Health and Health Services.

Master of Science in the field of biostatistics—Prerequisite: course work in multivariate calculus, matrix theory, and multiple regression (Math 33 and 124 and Stat 118) and proficiency in computer applications (Stat 130 or 183 or PubH 251). With approval of the academic director, applicants who lack some of the listed prerequisite course work may be admitted to degree candidacy and fulfill deficiencies during the first year of study; such course work does not count toward degree requirements.

Required: The general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 33 hours of course work, including Stat 201-2, 210, 224, 225, and 227; PubH 191, 201, 280, 290, and 291. Two elective courses are chosen from offerings of the Department of Statistics. A two-part Master's Comprehensive Examination is required.

Doctor of Philosophy in the field of biostatistics—Prerequisite: a master's degree in biostatistics or a closely related field, including the prerequisites listed under the Master of Science in the field of biostatistics. In some cases, an exceptionally well-prepared candidate may enter the program with a bachelor's degree.

Required: The general requirements stated under Columbian College of Arts and Sciences, including the required courses for the Master of Science in the field of biostatistics, plus Stat 213, 226, and 263; PubH 231 and one course chosen from PubH 205, 211, or 213. Electives are chosen from statistics and public health. At the end of the second year of study, a two-part General Examination is taken on probability and statistical inference.

and on biostatistics and epidemiology. A minimum of 12 hours of dissertation research is required; the dissertation must demonstrate the candidate's ability to do original research that develops methods or applications in the field of biostatistics.

295 Reading and Research (arr.)

Staff

May be repeated for credit.

299-300 Thesis Research (3-3)

Staff

398 Advanced Reading and Research (arr.)

Staff

Limited to students preparing for the Doctor of Philosophy general examination.

May be repeated for credit.

399 Dissertation Research (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

CHEMISTRY

Professors E.A. Carress, D.A. Rowley, D. Ramaker, M. King (*Chair*), A. Montaser, J.H. Miller, A. Vertes

Assistant Professors M.J. Wagner, C.L. Cahill, M.G. Zysmilich, L.P. Eisen, V. Sadtschenko

Master of Science in the field of chemistry—Prerequisite: a bachelor's degree with a major in chemistry from this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work normally includes Chem 207, 213, 221 or 222, 235, and 251. Proficiency in computer programming must be demonstrated. Candidates are required to pass a Master's Comprehensive Examination.

Thesis option—30 credit hours of approved courses are required, including Chem 299-300, Thesis Research, which may be in analytical, inorganic, organic, or physical chemistry.

Nonthesis option—36 credit hours of approved courses are required, including Chem 298. Up to 9 credit hours in other departments related to the student's area of interest (e.g., Forensic Sciences) may be included in the program, subject to the approval of the Department of Chemistry. Students who are or will be employed in organizations dealing with science, technology, and public policy programs may wish to select from specified courses offered by the Departments of Management Science, Political Science, and Public Administration and by the Elliott School of International Affairs.

Five-Year Bachelor of Science with a major in chemistry-Master of Science in Forensic Science with a concentration in forensic chemistry—See the Undergraduate Programs Bulletin.

Doctor of Philosophy in the field of chemistry—Required: the general requirements stated under Columbian College of Arts and Sciences. Students develop their program of studies in consultation with their doctoral committee, subject to the approval of the department's Graduate Affairs Committee. The program of studies must include course work in a minimum of five 200-level courses; at least four of the courses must be core courses as defined in the department's Guide to Graduate Studies; at least three must be offered by the Chemistry Department. These course requirements cannot be fulfilled by achievement on placement exams. At least two 200-level courses must be taken outside the subdiscipline of the student and in at least two other subdisciplines/disciplines. Equivalent courses offered by another university may be substituted at the discretion of the Graduate Affairs Committee. Proficiency in computer programming must be demonstrated. The General Examination requirement is replaced by a two-part requirement consisting of a cumulative examination system and a proposal for a research problem.

Research fields: analytical spectroscopy; catalysis; chemical instrumentation; combustion chemistry; environmental chemistry; heterocyclic chemistry; inorganic and organometallics synthesis; inorganic and organic materials; molecular spectroscopy; nanoscale and nanostructured materials; organic synthesis natural products; polymer chemistry; structure and reactivity studies; surface chemistry; theoretical chemistry; trace analysis; transition metal complexes.

Ph.D. students in chemistry may substitute up to 12 hours of Dissertation Research in the form of course work jointly approved by the Chemistry Department and the Forensic Sciences Department or the Science, Technology, and Public Policy program. The purpose of this option is to provide a useful background for chemistry doctoral students who are or may wish to be employed in forensic laboratories or organizations or agencies dealing with the forensic sciences or science, technology, and public policy programs. The 12

hours may be selected from specified courses offered by the Departments of Forensic Sciences, Management Science, Political Science, and Public Administration and by the Elliott School of International Affairs.

Note: All entering students in graduate chemistry programs are required to take the American Chemical Society Graduate Level Placement Examinations, given by the Department of Chemistry, prior to matriculation. The four placement examinations (in the disciplines of analytical, organic, inorganic, and physical chemistry) are designed to cover the subject matter in the disciplines generally taught in undergraduate programs preparatory for graduate work in chemistry, and the results are used by the department to advise the individual student in planning a program of courses appropriate to the student's background.

All graduate students are required to participate in the seminar and colloquium programs.

Upon consultation with course instructors, specific prerequisites may be waived for the particular courses.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 207 Chemical Bonding (3)** Ramaker
Quantum mechanics, approximate methods, electron spin, Pauli principle, atomic and molecular structure. Prerequisite: Chem 112. (Fall)
- 211-12 Physical Chemistry (1 to 3 each)** Ramaker, Wagner, Miller
Same as Chem 111-12. Admission only by departmental permission. Credit assigned upon satisfactory completion of Chem 213. (Academic year)
- 213 Chemical Thermodynamics (3)** Miller
Application of thermodynamics to chemical problems. Emphasis on statistical calculation of thermodynamic properties. Prerequisite: Chem 112 or 212. (Spring)
- 218 Molecular Spectroscopy (3)** Staff
Applications of quantum mechanics and group theory to the interpretation of electronic, vibrational, rotational, and magnetic resonance spectroscopy. Prerequisite: Chem 207. (Spring, odd years)
- 220 Selected Topics in Analytical Chemistry (1 to 3)** Staff
Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field of analytical chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.
- 221 Spectrochemical Analysis (3)** Montaser
Theory and application of recent spectrometric methods of analysis, including advances in optimization techniques, optical instrumentation, atomic spectroscopy, laser-based analytical techniques, X-ray methods, and surface analysis techniques. Prerequisite: Chem 122. (Fall)
- 222 Ions: Wet and Dry (3)** Vertes
Principles, instrumentation, methods, and applications of mass spectrometry and electrochemistry; selected state-of-the-art methods demonstrate basic principles to show how new methods of analysis are developed; typical applications highlight solutions of industrial, environmental, biomedical, and forensic problems. Prerequisite: Chem 122. (Spring, even years)
- 230 Selected Topics in Inorganic Chemistry (1 to 3)** Staff
Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field of inorganic chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.
- 235-36 Advanced Inorganic Chemistry (3-3)** Cahill
Application of modern chemical theories to inorganic substances and reactions; detailed study, developed from the periodic table, of the chemistry of the more common elements; electronic spectra and reaction mechanisms of complexes; organometallic chemistry; homogeneous and heterogeneous catalysis; bioinorganic chemistry. Prerequisite: Chem 112, 152. (Chem 235: spring; Chem 236: fall)
- 238 Inorganic Materials Chemistry (3)** Wagner
Synthesis, structure, and properties of materials such as ceramics, superconductors, ionic conductors, nanomaterials, and magnetic, optical, and electronic materials. Emphasis on traditional and low-temperature routes. Prerequisite: Chem 111-12. (Fall, even years)

- 240 Selected Topics in Physical Chemistry (1 to 3)** Staff
Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field of physical chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.
- 250 Selected Topics in Organic Chemistry (1 to 3)** Staff
Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field in organic chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.
- 251-52 Advanced Organic Chemistry (3-3)** Staff
Synthesis, reactions, and properties of organic compounds; fundamental theories of organic chemistry, emphasis on reaction mechanisms. Prerequisite to Chem 251: Chem 112, 152. Prerequisite to Chem 252: Chem 251. (Academic year)
- 257 Physical-Organic Chemistry (3)** Staff
The transition state theory of chemical kinetics, applications to reaction mechanisms; kinetic isotope effects, linear-free energy relationships, concentrated and "super" acids, Woodward-Hoffman rules, free radical reactions. Prerequisite: Chem 251 or permission of instructor. (Spring, odd years)
- 258 Synthesis and Structure Determination in Organic Chemistry (3)** Staff
The design of syntheses for complex organic molecules; survey of modern synthetic methods, including asymmetric induction; spectroscopic methods of structure determination. Prerequisite: Chem 251 or permission of instructor. (Fall, even years)
- 259 Polymer Chemistry (3)** Staff
A study of the preparation, properties, and structure of macromolecules. Prerequisite: Chem 152 and 110 or 111 or permission of instructor. (Fall, odd years)
- 260 Selected Topics (1 to 3)** Staff
Advanced topics offered in a modular format to allow an in-depth examination of a self-selected field in chemistry. One to three topics may be chosen for a given semester. May be repeated for credit.
- 264 Fundamentals in Computational Chemistry (3)** Staff
Fundamental concepts of chemical physics with an emphasis on computational techniques; physical principles of high temperature, chemically reacting gas mixtures, applications with current software. Prerequisite: Chem 11-12, Math 32, and CSci 100 or equivalent. (Fall)
- 265 Computational Chemistry of Biomolecules (3)** Vertes
Introduction to contemporary tools of computational chemistry used in solving biochemical and biological problems; focus on understanding fundamental principles of classical, quantum, and statistical descriptions of biopolymers augmented with hands-on experience in using current software. Prerequisite: Chem 264 or permission of the instructor. (Spring)
- 295 Research (arr.)** Staff
Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit. (Fall and spring)
- 298 Independent Study (3)** Staff
Limited to master's degree candidates. A survey of a topic approved by departmental staff and resulting in a written report, and the presentation of a seminar.
- 299-300 Thesis Research (3-3)** Staff
- 395 Independent Research (arr.)** Staff
Dissertation research for students in Unit I of the Doctor of Philosophy Program. May be repeated for credit.
- 398 Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy cumulative examinations. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

CIVIL AND ENVIRONMENTAL ENGINEERING

Professors K. Mahmood, I.H. Shames, K.H. Digges (*Research*), M.I. Haque, W. Roper (*Chair*)
Associate Professors N.E. Bedewi, A. Eskandarian, V. Motevalli (*Research*), R. Riffat,
M.T. Manzari
Assistant Professors C.D. Kan (*Research*), S.S. Badie

Adjunct Professors B. Whang, M.O. Critchfield, M. Yachnis
Professorial Lecturers G.C. Everstine, A. Kehnemui, C. Smith, C. Nash
Associate Professorial Lecturers K. Khozeimeh, G.W. Sherk

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees.

- 201 **Numerical Methods in Engineering** (3) Eskandarian and Staff
 Eigenvalue problems. Numerical solution of systems of equations and ordinary differential equations. Solution techniques for elliptic, parabolic, and hyperbolic partial differential equations. Numerical methods for solving finite element equations. Introduction to solution of fluid-flow problems. Prerequisite: CE 117 or approval of department. (Fall)
- 202 **Application of Probability Methods in Civil Engineering** (3) Mahmood
 Uncertainty in real-world information; basic probability concepts and models; random variables; useful probability distributions, statistical estimation of distribution parameters from observed data; empirical determination of distribution models; testing hypothesis; regression and correlation analyses; decision theory. Prerequisite: ApSc 115 or equivalent. (Fall, even years)
- 205 **Advanced Strength of Materials** (3) Manzari
 Deflection of beams using singular functions, unsymmetrical bending of beams, beams on elastic foundation. Beam-column problems, shear center for thin-walled beam cross sections, curved beams. Applications of energy methods, torsion, basic equations for theory of elasticity, thin- and thick-walled cylinders, stress concentration, and failure criteria. Prerequisite: CE 120. (Spring)
- 206 **Design of Reinforced Concrete Structures** (3) Badie
 Structural behavior of reinforced concrete structures, ultimate strength and deformation characteristics; design of structural components including beams, columns, floor slabs, box-type girders; introduction to prestressed concrete; special topics. Prerequisite: CE 192 or equivalent. (Fall)
- 207 **Prestressed Concrete Structures** (3) Badie
 Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 192 or equivalent. (Spring)
- 208 **Advanced Reinforced Concrete Structures** (3) Badie
 Conception, analysis, and design of low-rise and high-rise buildings by ultimate-strength methods, precast systems, progressive collapse, earthquake considerations, domes, folded plates, shell-type structures, and special topics. Prerequisite: CE 202 or equivalent. (As arranged)
- 210 **Methods of Structural Analysis** (3) Badie
 Modern methods of analysis of statically indeterminate structures, matrix analysis based on flexibility, stiffness, energy and variational methods, substructuring techniques; consideration of plastic collapse of structures; introduction to the finite element method. Prerequisite: graduate status. (Fall)
- 211 **Design of Metal Structures** (3) Badie and Staff
 Structural behavior of metal structures, conception and design of advanced structural components and systems, hysteretic behavior, plastic design principles, box-type girders, cable systems, composite girders, and special topics. Prerequisite: CE 191 or equivalent. (Spring)
- 212 **Advanced Metal Structures** (3) Badie and Staff
 Conception, analysis, and design of low-rise and high-rise buildings by elastic and inelastic methods, suspended roofs, earthquake considerations, and unique structural systems. Prerequisite: CE 201 or equivalent. (As arranged)
- 213 **Reliability Analysis of Engineering Structures** (3) Haque and Staff
 Probability theory, theory of structural reliability, probabilistic analysis of strength and loads, risk and reliability function, empirical distribution, probability plot. The design service life, method of perturbation, Monte Carlo simulation. Fatigue and fracture, proof testing, inspection and repair-replacement maintenance. Prerequisite: approval of department. (Fall, odd years)
- 214 **Analysis of Plates and Shells** (3) Haque and Staff
 Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded-plate structures. Theory of curved surfaces; general linear bending

- theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow-shell theory. (Spring, odd years)
- 215 **Theory of Structural Stability** (3) Haque, Manzari
General criteria for stability, buckling of elastic and inelastic columns and frames, torsional and lateral buckling, variational methods. Buckling of plates and shells under static loads, stability of stiffened structures, effect of imperfections and boundary conditions. (Fall)
- 216 **Structural Dynamics** (3) Manzari
Vibration of continuous systems: membranes, beam plates, and shells; approximate methods of vibration analysis; methods of integral transform; analysis of nonlinear systems; wave propagation. Prerequisite: approval of department. (Fall, odd years)
- 217 **Random Vibration of Structures** (3) Bedewi
Introduction to random processes, responses of linear structures to stationary and nonstationary random inputs. Structural responses to earthquakes, waves, boundary-layer turbulences, wind loads, etc. Failure analysis of structures under random loads. Prerequisite: approval of department. (Spring, even years)
- 218 **Structural Design to Resist Natural Hazards** (3) Manzari
Prediction of forces due to earthquakes and strong winds; generalized codes; pseudostatic methods for preliminary design, codes based on spectra, energy absorption and ductility; influence of foundations, ground failures; static and aeroelastic effects of strong winds. Design project. Prerequisite: approval of department. (Fall, even years)
- 220 **Introduction to Continuum Mechanics** (3) Manzari
Kinematics of a continuum, equations of motion, linear isotropic elastic solid, Newtonian viscous fluid, integral formulation of general principles, simple applications. Prerequisite: approval of department. (Fall)
- 221 **Theory of Elasticity I** (3) Manzari, Lee
Introduction to Cartesian tensors; deformation, stress, constitutive relations for linear elasticity; formulation of boundary value problems, variational principles, torsion and bending of prismatic rods, plane problems. Prerequisite: approval of department. (Spring)
- 222 **Plasticity** (3) Manzari
Introduction to the continuum theory of plastic deformation. Physical basis of rate-independent plasticity. Concepts of yield, strain hardening and softening, reverse yield, and cyclic plasticity. Constitutive equations describing plastic deformation. Prerequisite: CE 205 or 220. (Spring, odd years)
- 223 **Mechanics of Composite Materials** (3) Manzari
Stress-strain relationship for orthotropic materials, invariant properties of an orthotropic lamina, biaxial strength theory for an orthotropic lamina. Mechanics of materials approach to stiffness, elasticity approach to stiffness. Classical lamination theory, strength of laminates. Statistical theory of fatigue damage. Prerequisite: approval of department. (Spring, odd years)
- 225 **Introduction to Biomechanics** (3) Bedewi
Fundamentals of continuum mechanics as they apply to biological materials; concepts of stress, strain, and equilibrium; elastic and viscoelastic properties of solids; physiological fluid mechanics and bioheat and mass transfer. Fundamentals of solid mechanics of soft tissues and bone structures. Development of computer models and applications. Prerequisite: CE 120. (Spring)
- 226 **Advanced Biomechanics** (3) Bedewi
Historical overview of biomechanics and biomaterials. Fundamental concepts in mechanics as applied to the treatment of biological systems. Approaches to the mechanical analysis of the human structure under physiological and non-physiological loading conditions. Constitutive laws for biological materials. Finite element applications. Prerequisite: CE 220 or 225. (As arranged)
- 227 **Finite Element Methods in Engineering Mechanics** (3) Haque, Bedewi
Calculus of variations. Variational formulation of the finite element method. Weighted residual techniques. Computer implementation of the finite element method. Application to problems in heat transfer, stress analysis, fluid flow, and structural analysis. Prerequisite: approval of department. (Fall)
- 228 **Advanced Finite Element Methods in Structural Mechanics** (3) Manzari, Lee
Review of variational formulation of the finite element method. Formulation of various continuum and structural elements. Application to static and dynamic

- problems in elasticity, plasticity, large deflection, and instability in plates and shells. Recent developments in finite element methods. Prerequisite: CE 210, 227. (Spring, odd years)
- 230 **Fundamentals of Soil Behavior** (3) Manzari
Soil mineralogy, clay-water-electrolyte systems, soil composition, fabric, structure, volume change behavior, permeability, coupled phenomena, in-situ evaluation of soil behavior. Prerequisite: CE 168 or equivalent. (Fall, even years)
- 231 **Theoretical Soil Mechanics** (3) Manzari
Porous media, stress-strain behavior of soil skeleton, elastic and elastoplastic models for soil behavior, critical state concept, cam clay, strength of soils, stress-dilatancy, stress paths. (Fall, odd years)
- 232 **Geotechnical Engineering** (3) Manzari and Staff
Principles of soil mechanics applied to the analysis and design of mat foundations, pile foundations, retaining structures including sheeting and bracing systems, and waterfront structures. Foundations on difficult soils and reinforced earth structures. Prerequisite: CE 168 or equivalent. (Spring)
- 233 **Geotechnical Earthquake Engineering** (3) Manzari
Ground motion, wave propagation, foundation isolation, site response analysis, seismic stability of retaining structures, soil structure interaction. Prerequisite: graduate standing. (As arranged)
- 234 **Rock Engineering** (3) Manzari and Staff
Classification and properties of rock; nature of rock masses and rock discontinuities; field exploration; methods of excavation; design and applications to foundation slopes, tunnels, and chambers in rock. Prerequisite: approval of department. (As arranged)
- 240 **Environmental Chemistry** (3) Riffat and Staff
Principles of chemistry of natural waters, water supplies, wastewaters, hazardous wastes. Stoichiometry, equilibrium, solubility, kinetics, organic chemistry, biochemistry, analytical techniques. Examples from water/wastewater practice to illustrate applications. (Fall)
- 241 **Advanced Sanitary Engineering Design** (3) Riffat and Staff
Elements of design including basic parameters and hydraulic requirements. Layout and design of water supply and wastewater systems, pumping stations, and treatment plants. Plant expansions and modifications. Prerequisite: CE 197 or equivalent. (Spring)
- 242 **Principles of Environmental Engineering** (3) Riffat
Basic concepts of water, air, and terrestrial environments and interrelationships among them. Principles of environmental chemistry and microbiology. Assessment of environmental quality and impacts. Environment and health. Water and wastewater systems. Legal and regulatory controls. (Fall)
- 243 **Water and Wastewater Treatment Processes** (3) Riffat
Theory and application of commonly used processes. Sedimentation, coagulation, filtration, disinfection, gas transfer, activated sludge, trickling filters, oxidation ponds, sorption, and sludge stabilization and disposal. Process combinations to produce treatment systems. Prerequisite: CE 242. (Spring)
- 244 **Environmental Impact Assessment** (3) Riffat, Roper
Public policy and legislation on environmental quality. Methods for assessing impacts of engineering projects. Technology for assessing impacts on air, water, and land environments, applied to transportation facilities, water and wastewater facilities, industrial and community development. (Fall)
- 245 **Microbiology for Environmental Engineers** (3) Riffat and Staff
Principles of microbiology and applications to lakes, streams, hazardous wastes, and biological treatment systems. Methods for evaluating impacts of wastewaters and hazardous wastes on ecological systems. Concepts of limnology, including limiting of nutrients and control of nuisance growths. (Spring, even years)
- 246 **Advanced Treatment Processes** (3) Riffat and Staff
Principles and applications of advanced treatment systems for water, wastewater, and hazardous wastes, including: biological nutrient removal, oxidation-reduction processes, stripping, sorption, membrane processes, chemical precipitation, others. Prerequisite: CE 243. (Fall, even years)
- 247 **Industrial Waste Treatment** (3) Riffat and Staff
Types of industries, waste sources. Characteristics, measurements, and evaluation. Minimization and reuse. Treatment process selection, development, and

- design. Regulations, permits, standards, monitoring, and pretreatment. Prerequisite: CE 240 or approval of department. (Fall)
- 248 **Introduction to Hazardous Wastes** (3) Riffat, Roper
Regulations, including RCRA and Superfund. Transport and fate of hazardous substances. Elements of environmental toxicology, risk assessment, and hazard ranking. Monitoring, data collection, and evaluation. Waste minimization. Case histories. Prerequisite: approval of department. (Spring)
- 250 **Open Channel Flow** (3) Mahmood and Staff
Types and regimes of flow; energy and momentum principles, uniform flow, gradually varied flow, spatially and rapidly varied flow. Flow in nonprismatic channels. Unsteady flow, dam break problem, flood routing. Prerequisite: CE 193 or equivalent (Fall)
- 251 **Hydraulic Engineering** (3) Haque and Staff
Hydraulic design of conveyance, regulating, and measurement structures. Design for spillways, energy dissipators, inlet and outlet works related to dams. Forces on hydraulic structure and stability analysis. Hydraulic turbines and pumps. Design considerations for flow through pipes. Transients and cavitation. Prerequisite: CE 193 or approval of department. (As arranged)
- 252 **Design of Dams** (3) Mahmood and Staff
Project planning and investigations. Types of dams; design of earth-rock fill dams; stability analysis, foundation treatment, wind-wave protection. Construction methods for dams. Reservoir sedimentation. Safety inspection of dams. Prerequisite: CE 193 or graduate status. (Spring, even years)
- 253 **Advanced Hydrology** (3) Mahmood
Precipitation, evaporation, and transpiration. Soil physics; stream flow, drainage basins, hydrograph analysis, and stream-flow routing. Design criteria, flood frequency statistics and analysis, flood forecasting and control, water-supply forecasting. Prerequisite: CE 195 or equivalent. (Spring, even years)
- 254 **Groundwater and Seepage** (3) Haque and Staff
Permeability theory of groundwater flow, flow nets, analogs, computer solutions; applications to engineering problems such as excavation dewatering, flow through dams, stabilization of earth slopes. Prerequisite: approval of department. (Spring)
- 255 **Mechanics of Water Waves** (3) Haque
Irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves. Wave generation by wind. Wave breaking and reflexion. Prerequisite: ApSc 213 and permission of instructor. (As arranged)
- 256 **Water Resources Planning and Control** (3) Mahmood and Staff
The parameters of water resources planning and control, economics of water resources and related natural resources, economics of water-quality control, physical parameters of water resource development, water resources law. Prerequisite: approval of department. (Fall, even years)
- 257 **Hydraulic Modeling** (3) Mahmood and Staff
Dimensional analysis and similitude. Types of models—physical, mathematical. Distortions in physical models. Erodible bed models. Prerequisite: CE 193. (Spring, odd years)
- 258 **Numerical Methods in Environmental and Water Resources** (3) Mahmood and Staff
Use of microcomputers in water resources. Elements of finite difference schemes, basic operations, convergence, stability, and consistency. Nonuniform flow and error analysis; unsteady laminar flow; diffusion problems; unsteady flow in open channels; water hammer, seepage flow, and diffusion-dispersion problems. Prerequisite: approval of department. (Spring)
- 259 **Pollution Transport System** (3) Mahmood and Staff
Distribution of pollutants in natural waters and atmosphere, diffusive and advective transport, mathematics for stream pollutant deoxygenation rates, groundwater pollution transport, sediment transport, thermal transport, numerical simulation of pollutant transports in streams and estuaries. Prerequisite: CE 193, MAE 131. (Fall, even years)
- 260 **Analytical Mechanics** (3) Eskandarian and Bedewi
Fundamental principles, particle and rigid-body dynamics, generalized coordinates, variational principles and Lagrange's equations, nonholonomic systems,

- Hamilton's equations, theory of small oscillations. Prerequisite: approval of department. (Fall)
- 261 **Vehicle Dynamics (3)** Bedewi, Eskandarian, and Staff
Engineering principles and analytical methods explaining the performance of an automotive vehicle. Basic mechanics governing vehicle dynamic performance in longitudinal, ride, and handling modes. Engineering analysis techniques applied to basic systems and subsystems to derive the governing equations. Prerequisite or corequisite: CE 260. (Spring, even years)
- 262 **Vehicle Standards (3)** Bedewi, Digges, and Staff
Safety mandates and comparison of motor vehicles based on U.S. and European safety standards. Characteristics of dummies and mechanical devices specified for crash testing. U.S. national accident and injury data; calculation of benefits of safety measures. (Fall)
- 263 **Crash Investigation and Analysis (3)** Bedewi, Digges, and Staff
Crash reconstruction methods for systematic investigation of vehicle crashes. Analysis of vehicle safety systems and their effectiveness; computer simulation and analysis of crash data; sensitivity of analytical techniques; case investigations. (Spring)
- 264 **Nonlinear Finite Element Modeling and Simulation (3)** Bedewi, Eskandarian
Rigid and flexible body methods for modeling crashes. Application of dynamic nonlinear finite element methods with contact algorithms for modeling crash phenomena. Modeling and simulation of vehicles, airbags, safety restraining systems, and highway barriers. (Fall)
- 269 **Pavement and Runway Design (3)** Manzari
Pavement types, wheel-load characteristics; stresses in pavements and subgrades; empirical methods of design of flexible and rigid highway and airfield pavements; general principles of runway design. Prerequisite: graduate standing or department approval. (Spring, odd years)
- 270 **Systems Dynamics Modeling and Control (3)** Eskandarian, Bedewi
Introduction of concepts in control theory and applications to solve problems in civil and transportation engineering dealing with single-input/single-output and multi-input/multi-output systems. Review of classical control theory in the frequency and time domain, state-space analysis, system optimization, and non-linear control. (Fall)
- 272 **Traffic Engineering and Highway Safety (3)** Eskandarian and Staff
Roadway traffic capacity and network performance measures; steady and unsteady traffic flow phenomena; traffic control signalization theory and practical implementation; monitoring techniques, instruments, and data processing for highway safety. Traffic related highway safety design concepts. Prerequisite: graduate standing or approval of department. (Fall)
- 273 **Intelligent Transportation Systems (3)** Eskandarian, Roper, and Staff
Commands, controls and communications in modern multimodal transportation; infrastructure/highway and vehicle automation, advanced traffic management, vehicle control and safety systems; information, data, and sensory requirements; practical applications and projects. Prerequisite: graduate standing or approval of department. (Spring)
- 290 **Special Topics (3)** Staff
Topic to be announced in the *Schedule of Classes*.
- 298 **Research (arr.)** Staff
Basic research projects, as arranged. May be repeated for credit.
- 299-300 **Thesis Research (3-3)** Staff
- 320 **Theory of Elasticity II (3)** Lee, Manzari
Application of integral transform and analytic function theory to solution of plane problems; elastic wave propagation. Three-dimensional elasto-statics. Prerequisite: ApSc 211; CE 232. (Fall, odd years)
- 321 **Nonlinear Mechanics of Continua (3)** Lee, Manzari
Polar decomposition, invariance, isotropy, representation theorems for invariants and isotropic tensor functions. Deformation, kinematics, stress, balance principles. Principles for constitutive relations. Applications to nonlinear elasticity and non-Newtonian fluids. Prerequisite: approval of department. (Spring, even years)
- 350 **Sedimentation Engineering (3)** Mahmood and Staff
Problems of erosion and sedimentation. Properties of sediment. Initiation of motion. Suspension of sediment and sediment discharge theories. Sedimenta-

tion measurements. Economic and legal aspects. Prerequisite: CE 250 or approval of department. (Fall, odd years)

- 351 Mechanics of Alluvial Channels (3)** Mahmood and Staff
Physical processes in drainage basins and channels. Channel forms and bed forms. Hydraulics and sediment transport in alluvial channels. Design of stable channels. Qualitative and quantitative response of rivers. Channel stabilization, navigation channels. Case studies including environmental impacts. Prerequisite: CE 250 or approval of department. (Fall, even years)
- 352 Advanced Hydraulics (3)** Mahmood
Theory of unsteady flow. Diffusion and dispersion through pipes and open channels. Numerical solutions using finite element and finite difference methods. Prerequisite: CE 250 or approval of department. (Spring, even years)
- 370 Intelligent Systems Theory and Applications (3)** Eskandarian
Overview of artificial intelligence, neural networks, genetic algorithms, fuzzy systems, and hybrid intelligent systems and their integration with other information processing methods. Intelligent systems applications; examples are drawn from ITS and traffic engineering, vehicle safety, remote sensing, and structural design optimization. Prerequisite: CE 201, 270. (As arranged)
- 398 Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to Doctor of Science candidates. May be repeated for credit.

COMPUTER SCIENCE

Professors A.C. Meltzer, W.D. Maurer, L.J. Hoffman, S.Y. Berkovich, M.B. Feldman, P.S. Bock, J.L. Sibert, R.S. Heller, C.D. Martin, H.-A. Choi, A. Youssef, B. Narahari (Chair), S. Muftic

Associate Professors S. Rotenstreich, J.K. Hahn, R. Simha, D. Grier

Assistant Professors A. Bellaachia, R.W. Lindeman

Adjunct Professors G.J. Kowalski, D.C. Roberts

Professorial Lecturers J.H. Scharen-Guivel, S.H. Kaisler

Associate Professorial Lecturer T. Hanson

Assistant Professorial Lecturers R.A. Fernandez, R. Vittucci, T. Bragg

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees.

- 207 Scientific Databases (3)** Berkovich and Staff
Introduction to database management systems and information retrieval systems. Requirements of scientific databases; advanced data modeling techniques to capture the semantics of scientific applications. Data repositories and advanced retrieval capabilities. Database query languages and query optimization. Database web connectivity. Prerequisite: CSci 123 and either CSci 103 or 131. (Spring)
- 210 Advanced Software Paradigms (3)** Feldman and Staff
Object-oriented, procedural, functional, and concurrent software design paradigms; design patterns; software life-cycle concepts. Tradeoffs between compiled and interpreted languages. Examples from Ada, Java, C, C++, and Perl. Prerequisite: CSci 123, 131. (Fall and spring)
- 211 Computer Architectures (3)** Narahari and Staff
Concepts in processor, system, and network architectures; architecture of pipeline, superscalar, and VLIW/EPIC processors; multiprocessors and interconnection networks. Cache coherence and memory subsystem design for multiprocessor architectures. Parallel and distributed system architecture; introduction to internetworking. Prerequisite: CSci 123, 131. (Fall and spring)
- 212 Design and Analysis of Algorithms (3)** Youssef and Staff
Design and analysis of algorithms. Turing machines; NP-Complete theory. Algorithmic techniques: divide-and-conquer, greedy, dynamic programming, graph traversal, backtracking, and branch-and-bound. Applications include sorting and searching, graph algorithms, and optimization. Prerequisite: CSci 123, 131. (Fall and spring)

- 221 **Advanced Data Structures (3)** Berkovich and Staff
Sparse matrix transpose and multiplication. List insertion and deletion, lists of available space. In-order, preorder, and postorder traversal of trees. Topological sorting. Binary search trees, including AVL trees, B-trees, and tries. Dynamic hashing. Prerequisite: CSci 212. (Spring)
- 223 **Graph Theory and Applications (3)** Choi and Staff
Undirected and directed graphs. Connectivity, partitions, cycles and matchings. Edge and vertex coloring, chromatic polynomials, and the four-coloring problem. Planar graphs and Kuratowski's theorem. Properties of random graphs. Applications to a variety of problems. Prerequisite: CSci 212. (Spring, even years)
- 225 **Data Compression (3)** Youssef and Staff
Background on signals, information theory, transforms, human vision, and metrics. Lossless and lossy compression techniques. Video compression. Compression standards. Progressive transmission. Prerequisite: CSci 212. (Fall)
- 227 **Numerical Solutions of Algebraic Systems (3)** Meltzer and Staff
Numerical solutions of linear algebraic equations and the algebraic eigenvalue problem. Sparse matrix techniques. Solutions of nonlinear simultaneous equations. Interpolation and extrapolation. Prerequisite: CSci 212. (Fall, even years)
- 228 **Numerical Solutions of Differential Equations (3)** Meltzer and Staff
Numerical solutions of problems in one dimension. Calculus of finite differences in the derivation of the solution methods. Numerical quadrature; zeros of functions and zeros of polynomials; finite difference, predictor-corrector, and Runge-Kutta methods; boundary-value and eigenvalue problems of ordinary differential equations. Prerequisite: CSci 212. (Spring, even years)
- 232 **Computer Networks (3)** Simha and Staff
Fundamental concepts in the design and implementation of computer communication networks and internet, their protocols, and applications. Layered network architectures, applications, network programming interfaces, transport, routing, data link protocols, local area networks, network management, and network security. Prerequisite: CSci 211. (Fall)
- 233 **Internet Protocols (3)** Meltzer and Staff
Understanding of the layered protocols for the Internet. Interconnection of networks. The IP protocol and routing algorithms, switches, bridges, and routers. The transmission control protocol (TCP). Addressing and names. Application-specific protocols, FTP, TELNET, SMTP, SNMP, HTTP. Domain name services. Prerequisite: CSci 210, 232. (Fall)
- 234 **Design of Internet Protocols (3)** Meltzer and Staff
Protocol specifications and formal description methods. Finite-state descriptions of Internet protocols. Specification and Description Language. Implementation of protocol specifications. Prerequisite: CSci 212, 233.
- 235 **High-Performance Computing (3)** Narahari and Staff
Introduction to high-speed computer architecture. Parallel architecture, memory and I/O subsystems. Principles of pipelining and vector processing, pipeline computers and vectorization methods, examples of vector processors. Structures and algorithms for array processors, SIMD computers, interconnection networks, associative array processors. Prerequisite: CSci 211. (Fall, odd years)
- 238 **Computer System Performance (3)** Meltzer and Staff
Queuing models of computer systems and applications of queuing theory to computer modeling. Bounds on system performance. Mean-value analysis of computer systems. Modeling specific subsystems. Queuing models for analysis. Limitations of queuing models. Analysis of transaction processors and terminal-oriented systems. Prerequisite: CSci 211. (Fall, odd years)
- 239 **Comparative Computer Systems (3)** Youssef and Staff
Structures of computers and a system description language. History, characteristics, and philosophies of different computer structures. Special-purpose processors, multiprocessors, networks, and time-shared systems. Comparison of computer families. Performance evaluation. Effects of software and technology on computer structures. Prerequisite: CSci 211. (Spring, odd years)
- 241 **Database Management Systems (3)** Narahari and Staff
Design and architecture of relational database management systems; query languages, data models, index structures, database application design. Prerequisite: CSci 210 or equivalent. (Fall)

- 242 Database Systems (3)** Narahari and Staff
Concepts in database systems. Relational database design. Editing, report generation, updating, schema refinement, tuning. Construction of database management systems. Conceptual and logical design of a database. Prerequisite: CSci 241. (Spring)
- 244 Information Retrieval Systems (3)** Berkovich and Staff
Information organization and retrieval of natural language data by digital computer systems; statistical, syntactic, and logical analysis of natural language; dictionary and thesaurus systems; searching strategies and cataloging. Large-scale file structures. Prerequisite: CSci 210. (Spring)
- 246 Compiler Optimization (3)** Narahari and Staff
Overview of compilers, parsing techniques, code generation. Compiler optimization techniques, including register allocation, instruction scheduling. Compiler design for ILP processors. Prerequisite: CSci 211, 212. (Fall, even years)
- 251 Distributed Operating Systems (3)** Rotenstreich and Staff
Architecture, concurrent processes, interprocess communication, distributed scheduling, distributed shared memory, distributed security, synchronization and elections, distributed agreement, transactions and replicated data. Prerequisite: CSci 210, 212. (Fall)
- 253 Object-Oriented Design (3)** Rotenstreich and Staff
Object-oriented systems, software reusability, software modularity, top-down and bottom-up approaches, object classification, genericity, metaprogramming, concurrent object-oriented programming languages. Prerequisite: CSci 210. (Spring)
- 254 Software Engineering (3)** Rotenstreich and Staff
The life-cycle model. Requirements and specifications. Design models, structured and object-oriented design. Program development, PDL's tools, configuration control. Program, unit, and integration testing. Program verification. Other development models. Development metrics. Computer-aided software engineering (CASE). Prerequisite: CSci 210, 212. (Spring)
- 255 Software Engineering Development (3)** Rotenstreich and Staff
Formal methods in software engineering. First-order logic, basic specification elements, rigorous proofs, formal development process, concurrency. Prerequisite: CSci 212. (Fall)
- 256 Software Testing and Quality (3)** Rotenstreich and Staff
Flow graphs and path testing, transaction flow testing, data flow testing, software metrics, system testing, test planning and documentation, reliability, statistical testing. Prerequisite: CSci 254. (Fall)
- 259 Advanced Object-Oriented Programming (3)** Maurer and Staff
The design patterns of Gamma, Helm, Johnson, and Vlissides. The C++ Standard Template Library (STL), a generic programming paradigm that has been adapted to the C++ programming language, and is an extensible framework for generic and interoperable components. Prerequisite: CSci 210 or familiarity with C++, data structures, and object-oriented programming. (Spring)
- 260 Design of Interactive Multimedia (3)** Heller and Staff
History, theory, and development of multimedia concepts. Hardware components, platforms, and authoring tools. Scientific, technical, and cognitive foundations of various media including text, sound, graphics, and video. Interface design. Use of a media taxonomy as a design and evaluation tool. Completion of a multimedia portfolio required. Prerequisite: CSci 210. (Fall)
- 261 Design and Implementation of Educational Software (3)** Martin and Staff
History and types of computer-based learning (CBL). Models of learning theory and instructional design. Scripted and generative design strategies, use of authoring systems. Intelligent tutoring systems. Dissemination, legal issues. Overview of research issues in CBL. Project required. Prerequisite: CSci 260. (Spring)
- 262 Computer Graphics Programming Tools (3)** Hahn and Staff
Standard graphics and animation programming tools and packages. Lab-specific software tools for sound, motion control, and rendering. Hardware used for video recording and editing. Peripheral devices such as stereo glasses, head-mounted displays, and trackers. Prerequisite: CSci 185. (Spring)
- 263 Computer Graphics II (3)** Hahn and Staff
Curves and surfaces. Spatial sampling and aliasing. Visible surface algorithms. Illumination and shading models, raytracing and radiosity. Image manipulation and texture mapping. Procedural models. Prerequisite: CSci 185. (Spring)

- 264 **Design of Human-Computer Interface (3)** Sibert and Staff
Design of dialogues for interactive systems. Psychological, physiological, linguistic, and perceptual factors. Advantages and disadvantages of various interaction techniques, command language syntaxes, and data presentations. Design methodology and guidelines. Case studies, research readings, and projects. Prerequisite: CSci 210. (Spring)
- 266 **Computer Animation (3)** Hahn and Staff
Euler angles and quaternions; articulated figure motion; forward and inverse kinematics; kinematic, physically based, and behavioral motion control; rendering problems (temporal aliasing); sound synthesis and synchronization; recording and editing techniques. Prerequisite: CSci 185 or permission of instructor. (Fall)
- 270 **Artificial Intelligence (3)** Bock and Staff
Representation and space search. Heuristic search. Predicate calculus. Knowledge representation and knowledge engineering for expert systems. Rule-based, hybrid, and O-O systems. Semantic nets, frames, and natural language. Theorem provers. Overview of planning, learning, neural nets. Use of AI languages. Prerequisite: CSci 174, 212. (Fall)
- 271 **Adaptive Learning Systems I (3)** Bock and Staff
Learning as an alternative to rule-based schemes for artificial intelligence. Deterministic and probabilistic simulation of games. Markovian and bounded-context systems. The algedonic process. Introduction to collective learning systems theory. Design, simulation, and evaluation of collective learning automata. Prerequisite: CSci 174, 212. (Fall)
- 278 **Models of Cognition (3)** Bock and Staff
The central nervous system as a natural precedent for AI: structure and function of the neuron and neural networks; sensors and actuators; modular brain function. The cognitive process. Intelligence metrics. Genetics and self-organizing systems. Memory mechanisms. The psychological basis of learning and behavior. Prerequisite: CSci 174, 212. (Spring, odd years)
- 283 **Computer Security Systems I (3)** Hoffman and Staff
Techniques for security in computer systems. Authentication, logging, authorization, encryption, international criteria. Effects of operating systems and machine architecture, countermeasures, risk-analysis systems. Prerequisite: CSci 131. (Fall)
- 284 **Computer Cryptography (3)** Hoffman and Staff
Cryptography and codes. Secure communications using DES and public key algorithms. Key management, authentication, and signatures. Secure voice, video, and data. Securing the Internet. Prerequisite: CSci 212. (Spring)
- 285 **Information Policy (3)** Hoffman and Staff
Issues related to computers and privacy, equity, freedom of speech, search and seizure, access to personal and governmental information, professional responsibilities, ethics, criminality, and law enforcement. Examines policy issues using written, electronic, and videotape proceedings of recent major cross-disciplinary conferences. Prerequisite: permission of instructor. (Fall)
- 297 **Special Topics (1 to 3)** Staff
Topics to be announced in the *Schedule of Classes*. (Fall and spring)
- 298 **Research (arr.)** Staff
Applied research and experimentation projects, as arranged. May be repeated for credit.
- 299-300 **Thesis Research (3-3)** Staff
- 301 **Research and Evaluation Methods (3)** Bock and Staff
Methods for the conduct of research and development projects: the scientific method; research design requirements and objectives; qualitative, quantitative, and case studies; performance metrics; design procedures and control; sources of error and bias; evaluation tools; formal validation methods; oral and written reports; documentation standards. Prerequisite: ApSc 115. (Fall)
- 325 **Advanced Computing Algorithms (3)** Choi and Staff
Graph algorithms, strongly connected components, biconnected components, dominators in acyclic graphs, ordered trees, network flow, planarity testing, bipartite matching, theory of NP completeness, NP-complete problems. Design and analysis of approximation algorithms for NP-complete problems. Prerequisite: CSci 212. (Spring, odd years)

- 326 Parallel Algorithms (3)** Youssef and Staff
Design and analysis of parallel algorithms. Topics include shared- and distributed-memory parallel computation models, graph algorithms, divide-and-conquer algorithms, numerical problems, parallel algorithms for combinatorial optimization methods. Prerequisite: CSci 211, 212. (Spring, even years)
- 338 Advanced Topics in Distributed Systems (3)**
Seminar on current research and developments in networks and distributed systems. May be repeated for credit. Prerequisite: CSci 234. (Fall, odd years)
- 339 Advanced Topics in Computer Architecture (3)**
Seminar on current research and developments in computer architecture. May be repeated for credit. Prerequisite: CSci 235. (Spring, even years)
- 342 Advanced Topics in Programming Systems (3)**
Seminar on current research and developments in computer programming languages, systems and paradigms. May be repeated for credit. Prerequisite: CSci 210. (Spring, odd years)
- 343 Advanced Topics in Information Systems (3)**
Seminar on current research and developments in computer database systems and information retrieval. May be repeated for credit. Prerequisite: CSci 242 or 244. (Fall, odd years)
- 351 Advanced Topics in Operating Systems (3)**
Seminar on current research and developments in computer operating systems. May be repeated for credit. Prerequisite: CSci 251. (Spring, even years)
- 355 Advanced Topics in Software Engineering (3)**
Seminar on current research and developments in software engineering. Students develop a software package with the aid of available software tools such as requirement tool, design tool, code generators, testing tools, measurement tools, cost estimation tools. Prerequisite: CSci 255, 256. (Fall, even years)
- 361 Advanced Topics in Interactive Multimedia (3)**
Seminar on current research and developments in interactive multimedia. Team projects encompassing system design, system production, productivity tools, project management, cost analysis, prototyping, testing, and evaluation. Prerequisite: CSci 260. (Spring, even years)
- 362 Advanced Topics in Human-Computer Interaction (3)**
Seminar on current research and developments in human-computer interaction. May be repeated for credit. Prerequisite: CSci 264. (Fall, odd years)
- 367 Advanced Topics in Computer Graphics (3)**
Seminar on current research and developments in computer graphics. Spatial and temporal anti-aliasing; hidden-surface algorithms; illumination models; radiosity; textural mapping. May be repeated for credit. Prerequisite: CSci 263. (Fall, even years)
- 368 Advanced Topics in Animation and Virtual Reality (3)**
Seminar on current research and developments in computer animation and virtual reality. May be repeated for credit. Prerequisite: CSci 266. (Spring, odd years)
- 371 Adaptive Learning Systems II (3)** Bock and Staff
Alternative memory structures. Selection and modification policies. Environmental models and evaluation policies. Metrics for performance evaluation of collective learning systems automata. Self-organizing, hierarchical networks of collective learning cells. Prerequisite: CSci 271. (Spring, odd years)
- 372 Natural Language Understanding (3)** Bock and Staff
The state of the art of natural language parsing and semantic understanding by computer systems. Review of formal, context-free, and transformational grammars and parsing. Augmented transition networks; problems of complexity, semantics, and context. Deterministic parsing and semantic parsing. Prerequisite: CSci 270. (Fall, odd years)
- 377 Advanced Topics in Machine Intelligence and Cognition (3)**
Seminar on current research and developments in machine intelligence and cognitive science. May be repeated for credit. Prerequisite: Permission of instructor. (Fall, even years)
- 383 Computer Security Systems II (3)** Hoffman and Staff
Intrusion detection. Viruses, worms, and other rogue programs. Advanced risk analysis methodologies, developing international standards, and computer security models, such as those of Bell and LaPadula, Biba, and Clark and Wilson.

- Computer network security. Advanced protection against statistical inference. Web security. Biometrics. Prerequisite: CSci 283. (Spring, odd years)
- 384 **Information Warfare (3)** Hoffman and Staff
Exploration of the political and operational implications of information warfare from the fields of criminal justice and computer and international security. Offensive and defensive information warfare operations. Simulation of various attacks on and defense of computer systems. Prerequisite: CSci 285. (Spring)
- 385 **E-commerce Security (3)** Hoffman and Staff
Advanced technical topics in e-commerce security. X.500 registration systems, X.509/PKIX certification systems, secure payment methods, smart cards, authorization models in open distributed environments. Secure web systems, technologies, and applications. Prerequisite: CSci 383. (Fall)
- 386 **Java Security Mechanisms (3)** Hoffman and Staff
Theoretical overview and practical aspects of Java security solutions. Students develop individual Java security modules and integrate them into a complete Java security system. Prerequisite: CSci 383. (Spring)
- 387 **Advanced Topics in Information Assurance (3)**
Seminar on current research and developments in information assurance. May be repeated for credit. Prerequisite: CSci 283. (Spring, even years)
- 390 **Colloquium (0)** Staff
Lectures by outstanding authorities in computer science. Topics to be announced each semester. (Fall and spring)
- 398 **Computer Science Research (arr.)** Staff
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Science candidates. May be repeated for credit.

COUNSELING/HUMAN AND ORGANIZATIONAL STUDIES

Professors D. Linkowski, J.C. Heddesheimer, D.W. Dew, C.H. Hoare, M. Sashkin, D.R. Schwandt
Associate Professors N.E. Chalofsky, J. Garcia, M. Marquardt, R.B. Morgan, S.A. Marotta (Chair)
Assistant Professors L.A. Horvath, R. Lanthier, P.L. Schwallie-Giddis, C.D. Erickson, A.J. Casey, C. Kayes, M.S. Wesner, L.A. Granato (Visiting), K.C. Hergenrather
Assistant Professorial Lecturers R.J. Pasi, T.J. Martin
Lecturer P. Tschudi

See the Graduate School of Education and Human Development for programs of study leading to the degrees of Master of Arts in Education and Human Development, Education Specialist, and Doctor of Education.

COUNSELING

- 201 **Head Injury Rehabilitation (3)** Garcia
Basic anatomy and physiology of the brain; causes, types, and severity of head injuries. Physical, cognitive, and psychological consequences of head injuries and rehabilitation strategies. Prerequisite: Cnsl 251 or 276.
- 220 **Special Workshop (arr.)** Staff
Topics to be announced in the *Schedule of Classes*. May be repeated for credit.
- 251 **Professional and Ethical Orientation to Counseling (3)** Heddesheimer, Garcia, Marotta, Pasi
The roles and functions of a professional counselor and the ethical standards that govern the profession.
- 253 **Counseling Interview Skills (3)** Hergenrather, Heddesheimer, Erickson
Acquisition of counseling skills common to all theories through lectures, demonstrations by faculty, role playing, and videotaping. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others. Material fee, \$25.
- 254 **Psychosocial Adjustment (3)** Hoare, Linkowski
Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents.

- 255 **Career Counseling** (3) Erickson, Schwallie-Giddis
A consideration of theory, practice, and the body of information related to career counseling, choice, and development over the life span. Prerequisite: Cnsl 253, 259 (for counseling majors); permission of instructor is required for others. Material fee, \$25.
- 257 **Individual Assessment in Counseling** (3) Marotta, Linkowski
Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); Psyc 131 or Educ 212 or permission of instructor is required for others. Material fee, \$25.
- 259 **Theories and Techniques of Counseling** (3) Schwallie-Giddis
An introduction to basic counseling and psychotherapeutic theories and associated techniques. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 261 **Group Counseling** (3) Heddesheimer, Linkowski, Marotta, Pasi
Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 263 **Social and Cultural Dimensions of Counseling** (3) Garcia
Basic sociocultural concepts in counseling theory and how they apply to the practice of the counseling profession. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 264 **Values, Spiritual, and Religious Issues in Counseling** (3) Staff
The theoretical and practical intersection of counseling, psychotherapy, and mental health considerations with religion and spirituality. The clinically effective and ethically responsible integration of religion and spirituality into counseling. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 266 **Foundations of School Counseling** Heddesheimer, Schwallie-Giddis
K-12/Practicum (3)
Study of the environmental and specialty elements for school counseling, with special attention to the principles and practices of school counseling. Includes 100 hours of supervised practicum in a school setting.
- 267 **Foundations of Employee Assistance Programs** (3) Staff
History, legislation, and foundations of practice of counseling in employee assistance programs. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 268 **Foundations of Community Counseling/Practicum** (3) Erickson, Marotta
Description of community counseling settings, problems clients present, and a consideration of appropriate intervention strategies. Includes 100 hours of supervised practicum in a community counseling program.
- 269 **Substance Abuse Counseling** (3) Hergenrather
Individual, group, family, and self-help counseling applied to substance abusers. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 271 **Family Counseling** (3) Marotta
The family as a system: how it affects the client and how the client affects it. Didactic presentations, role playing, and work with simulated families. Prerequisite or concurrent registration: Cnsl 251 or 276 (for counseling majors); permission of instructor is required for others.
- 272 **Human Sexuality for Counselors** (3) Hoare, Marotta
The purpose of this course is to increase the awareness and understanding of sexuality as it relates to counseling in contemporary society. Prerequisite or concurrent registration: Cnsl 251 or 276 (for counseling majors); permission of instructor is required for others.
- 274 **Counseling Older Persons** (3) Linkowski
Special considerations and counseling emphases in regard to the life transitions and role changes that occur for older persons. Prerequisite or concurrent registration: Cnsl 251 (for counseling majors); permission of instructor is required for others.
- 275 **Living and Dying: A Counseling Perspective** (3) Tschudi
Survey of fundamental psychosocial issues surrounding grief, loss, and life-threatening illness. Topics include AIDS, suicide, multiple loss, caregiver's grief, spirituality, and cross-cultural issues.

- 276 **Foundations of Rehabilitation and Case Management/Practicum (3)** Garcia, Hergenrather
Survey of history, philosophy, basic principles, legislation, roles, and services. Includes 100 hours of supervised practicum in a rehabilitation counseling program.
- 278 **Disability Management and Psychosocial Rehabilitation (3)** Hergenrather, Linkowski, and Staff
Disability management services; psychosocial aspects of disability; rehabilitation services for persons with psychiatric disabilities.
- 280 **Job Placement and Supported Employment (3)** Linkowski
Job development and modification; placement of persons with disabilities.
- 281 **Medical and Psychosocial Aspects of Disabilities (3)** Garcia
Chronic and traumatic disorders with rehabilitation and psychosocial implications.
- 285 **Internship in Counseling I (3)** Staff
Part of a two-semester clinical experience for degree candidates in counseling. Material fee, \$50.
- 286 **Internship in Counseling II (3 to 6)** Staff
Part of a two-semester clinical experience for degree candidates in counseling. Material fee, \$50. Prerequisite: Cnsl 285.
- 293-94 **Research and Independent Study (1 to 3)** Staff
Individual research under guidance of a staff member. Program and conferences arranged with an instructor.
- 298-99 **Thesis Research (3-3)** Staff
- 344 **Advanced Group Counseling (3)** Heddesheimer, Marotta, Linkowski, Pasi
A post-master's course on interpersonal process groups, with didactic, experiential, and supervisory components. Prerequisite: Cnsl 261 or equivalent; permission of instructor is required.
- 352 **Organization and Administration of Counseling Services (3)** Marotta
Theory and practice of consultation and administration, with focus on school, community, and rehabilitation settings. Research issues. Admission by permission of instructor.
- 353 **Work, Identity, and Adult Development (3)** Hoare
Same as HDev/HRD 353.
- 357 **Doctoral Practicum in Counseling (2)** Marotta, Linkowski
Experiential learning of advanced counseling and counseling-related competencies through direct, supervised participation in group work, research, teaching, and/or consultation. Admission by permission of instructor.
- 358 **Advanced Theories of Counseling (3)** Garcia, Erickson
Current research on counseling and psychotherapy process and outcome; critical analysis of theory with applications for practice and research. For Ed.S. and Ed.D. degree candidates in the field of counseling. Admission by permission of instructor.
- 359-60 **Doctoral Internship in Counseling and Counselor Supervision (2-2)** Marotta, Linkowski
- 361 **Seminar: Counseling (arr.)** Staff
- 390 **Predissertation Seminar (3 to 6)** Linkowski, Marotta
- 391 **Dissertation Research (arr.)** Staff
Prerequisite: Cnsl/Educ 390.

HUMAN DEVELOPMENT

- 208 **Lifespan Human Development (3)** Hoare, Lanthier
Continuity and change in developmental attributes. The developing person in relation to social norms, roles, and stage-graded expectations from birth to death. Interaction between biogenetics and environment. (Fall)
- 209 **Child Development (3)** Lanthier
Normal development and the familial and social antecedents of developmental risk. Environments that foster competent children and developmental sequelae of childhood vulnerability and trauma. Adulthood consequences of child abuse and neglect. (Spring)

- 210 **Stress, Risk, and Resilience in Adolescent Development (3)** Lanthier
Key attributes and problems in adolescent development. Normal adolescent development and contemporary social problems in relation to stress, risk, and resilience. For graduate students in counseling, psychology, and related areas. (Spring)
- 229 **Cultural Effects on Child, Adolescent, and Adult Development (3)** Hoare and Staff
Effects of culture on the experience and expression of self, others, space, time, faith systems, norms, and other attributes. Egocentric and sociocentric effects. primitive and technological effects. Group immersion as the basis for prejudice. Developmental consequences as a consequence of cultural context. (Fall)
- 261 **Practicum in Human Development (3)** Hoare and Staff
Admission by permission of instructor. (Fall and spring)
- 262 **Internship in Human Development (3)** Hoare and Staff
Admission by permission of instructor. (Fall and spring)
- 281 **Adult Learning (3)** Hoare
Same as HRD 281. (Fall)
- 341 **Emotional and Cognitive Development (3)** Hoare
The development and maintenance of emotional competence, cognitive development, self-esteem, social cognition, and interpersonal skills. Relationships between intellectual reasoning and insight. (Fall, even years)
- 344 **Adult Development and Aging (3)** Hoare
Theories and research on personality and intelligence in adulthood and old age. Research designs and methods. Implications of developmental data for counseling and selected professional roles. (Spring)
- 353 **Work, Identity, and Adult Development (3)** Hoare
The influence of work on identity, intellectual and personality development, and other developmental attributes.
- 356 **Issues and Special Topics in Human Development (3 to 6)** Hoare and Staff
Issues and special contemporary topics related to child, adolescent, and adult development. Applications for professional roles. (Spring, even years)

HUMAN RESOURCE DEVELOPMENT

- 220 **Special Workshop (arr.)** Staff
Topics to be announced in the *Schedule of Classes*. May be repeated for credit.
- 236 **Technology and Human Resource Development (3)** Marquardt
How technology can best be utilized in the HRD environment. Discussion of CBT, use of the Internet for instruction, and distance learning techniques.
- 239 **International and Multicultural Human Resource Development (3)** Marquardt
The impact of culture and globalization on U.S. and international HRD programs and practices. Adult learning and organizational change approaches that develop and utilize the synergy of workforce diversity. Successful international HRD programs.
- 263 **Foundations of Human Resource Development (3)** Chalofsky and Staff
How individuals and groups learn and interact within organizations and how organizations function and learn. Motivation, group dynamics, systems theory, organizational culture, and change.
- 264 **Design of Adult Learning in Human Resource Development (3)** Kayes
Designing and implementing training programs. Topics include instructional design techniques, designing effective programs, program planning and marketing techniques, and conducting needs assessments and evaluations of training programs.
- 269 **Organization Diagnosis for HRD (3)** Schwandt, Horvath, Wesner
The assessment of organizational conditions, including collection and interpretation of information, operations, and problems (human, structural, and systemic). Course participants collect and analyze data to provide solutions to enhance organizational effectiveness.
- 272 **Internship in Adult Learning and Human Resource Development (3 to 6)** Staff
Supervised experience in selected areas of human resource development and adult education. Admission by permission of instructor.

- 274 **Work Groups and Teams in Organizations (3)** Horvath, Chalofsky, Wesner
Exploration of the nature of work groups and teams as they are utilized in organizational settings. Group and team dynamics, facilitating and leading skills, and group roles and boundaries.
- 277 **Explorations in Innovative Learning (3)** Chalofsky, Wesner
Specialized learning techniques in non-traditional and traditional settings. Topics are chosen in consultation with students and include areas such as outward-bound type activities and creative arts as media for effective adult learning.
- 281 **Adult Learning (3)** Hoare, Kayes
Premises and theories used to meet learning needs of adults. Overview of various learning theories and the impact of various stages of adult development on learners. Topics including self-directed learning, accommodating individual learning needs, and creation of effective learning techniques. Same as HDev 281.
- 282 **Strategies for Adult Learning (3)** Kayes
Theoretical and practical components of instructional delivery in various settings, including corporate training environments. Students design and implement teaching strategies, such as concept attainment, group investigation, and creative thinking.
- 283 **Leadership in Organizations (3)** Sashkin
Developments in theory and research centered on transformational leadership.
- 284 **Assessing Impact of HRD Efforts (3)** Morgan
Knowledge and skills needed to evaluate the impact and return on investment of HRD efforts. Focus on how to plan and conduct systematic evaluations of HRD efforts, including the choice, development, and use of various tools for measuring individual, group, and organizational change.
- 286 **Issues in Human Resource Development Programs (3)** Horvath
Current issues and topics of importance in the field. Students gather data and analyze key topics associated with areas such as globalization, diversity in the workplace, organizational development, and ethics.
- 287 **Strategic Human Performance Processes (3)** Morgan, Wesner
Overview of systematic coordination and use of HR management concepts as an integral element of organizational strategy. HRD implications of these tools, with an emphasis on building the HR system.
- 289 **Consulting Skills in Human Resource Development (3)** Sashkin, Casey
Introduction to the concepts, methods, and skills required for effective consultation in organizations, as either an internal or an external consultant. Meeting the human needs in organizations, while improving performance and productivity. Students undertake a consulting project in an organization. Prerequisite: HRD 269.
- 290 **Organizational Learning (3)** Schwandt, Casey
Learning in an organizational context. Processes through which the organization as a system learns, unlearns, changes, and disseminates information. Organizational learning theories address the processes and barriers of gathering, using, developing, and retaining knowledge in organizations.
- 293-94 **Research and Independent Study (1 to 3)** Staff
For students who have a specific interest in a topic related to HRD. An in-depth project is completed under the guidance of a faculty member. The course is arranged individually with an instructor.
- 299-300 **Thesis Research (3-3)** Staff
Staff
- 320 **Topics in Human Resource Development Doctoral Studies (3)** Staff
Topics to be announced in the *Schedule of Classes*.
- 321 **Seminar: Advanced Issues in Human Resource Development (3)** Sashkin, Casey
- 327 **Seminar: Applied Research in Human Resource Development (3)** Sashkin, Casey
- 353 **Work, Identity, and Adult Development (3)** Hoare
Same as Cnsl/HDev 353.
- 363 **Foundations of Human Resource Development (3)** Chalofsky and Staff
Relationships between individuals and their interactions in groups within an organizational context. Overview of theoretical foundations of key areas associated with HRD. Motivation, systems theory, group dynamics, organizational culture, and learning.

- 369 **Theory and Design of Organizational Diagnosis** (3) Schwandt, Horvath
Focus on various paradigms through which organizations and their functions may be viewed; a variety of analytical models of organizations; techniques for assessing systems; application of analysis techniques.
- 374 **Work Groups and Teams in Organizations** (3) Horvath, Chalofsky, Morgan
Theoretical understanding and practical considerations of working with groups and teams. Group dynamics, facilitating and leading groups, and member roles. Group facilitation techniques across different group settings and environments.
- 379 **Practicum in Adult Learning Programs** (3 to 6) Staff
- 380 **Advanced Organizational Learning** (3) Schwandt, Casey
The psychological and sociological paradigms associated with the learning of a collective whole.
- 381 **Theory, Research, and Practice in Adult Learning Development** (3) Hoare, Kayes
Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environments in adult education situations.
- 386 **Interdisciplinary Readings in Human Resource Development** (3) Schwandt, Casey, and Staff
Seminal works from various disciplines related to current HRD research and practice.
- 390 **Predissertation Seminar** (3 to 6) Staff
- 391 **Dissertation Research** (arr.) Staff
Prerequisite: HRD/Educ 390.

CRIMINAL JUSTICE

See **Sociology and Forensic Sciences**.

EARTH AND ENVIRONMENTAL SCIENCES

Professors J.F. Lewis (*Chair*), G.C. Stephens, G.A. Goodfriend (*Research*)
Associate Professor R.P. Tollo
Assistant Professors A.V. Logan (*Research*), C.M. Fedo, J. Hanchar, H.H. Teng
Professorial Lecturers J.H. Kravitz, M.J. Baedecker
Associate Professorial Lecturer M.K. Brett-Surman
Assistant Professorial Lecturers R. Seal, R.A. Ayuso
Lecturer R.T. Rye

Master of Science in the field of geoscience—Prerequisite: the degree of Bachelor of Arts or Bachelor of Science with a major in geology or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. Both thesis and nonthesis options are available. Under the thesis option, a minimum of 30 credit hours of course work is required, including EES 299–300. Under the nonthesis option, a minimum of 36 credit hours of course work is required; course work must include EES 128, 174, 189, 219, and 295. Two electives should be chosen from EES 216 or 263, 211 or 224, 143 or 249, and 254 or 266.

Doctor of Philosophy in the field of geoscience—Required: the general requirements stated under Columbian College of Arts and Sciences and the satisfactory completion of the General Examination in three fields, one of which must be in geochemistry, petrology, stratigraphy/sedimentation, or structural geology.

Research fields: geochemistry, hydrogeology, mineralogy, geobiology, petrology, sedimentology, stratigraphy, and structural geology.

The master's program in environmental and resource policy offered by the Department of Earth and Environmental Sciences is listed separately.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

Note: Programs offered by the Department of Earth and Environmental Sciences are under development; please verify information here with the department. All graduate students are required to participate in the invited speaker seminar series.

- 211 **Advanced Mineralogy and Petrographic Analysis (3)** Tollo
Review of the lattice structure, crystal chemistry, petrographic observations and petrologic information, and phase relations of rock-forming minerals. Application of mineralogic data to solution of geologic problems is emphasized. Prerequisite: EES 111, 112 (or equivalent); or permission of the instructor. (Spring, even years)
- 216 **Sedimentary Petrogenesis (3)** Fedo
Origin and evolution of clastic sediments from a geochemical and petrographic perspective. Emphasis on a quantitative treatment of major elements, trace elements and rare earth elements to extract provenance and weathering information. Prerequisite: EES 117, 118, 166. Laboratory fee, \$30. (Fall, odd years)
- 219 **Petrogenesis (3)** Lewis
The origin of selected igneous and metamorphic rock types. Prerequisite: EES 117, 118, or permission of instructor. Laboratory fee, \$25. (Fall)
- 224 **Advanced Structural Geology (3)** Stephens
Contemporary topics in structural analysis and tectonics. Prerequisite: EES 122. (Spring, odd years)
- 249 **Seminar: Geochemistry (3)** Hanchar, Teng
Independent topics; may be repeated for credit.
- 250 **Seminar: Geoscience (3)** Staff
Independent topics; may be repeated for credit.
- 254 **Evolutionary Paleobiology (3)** Staff
Analysis of special topics in macroevolution—paleobiogeography, speciation, taphonomy, evolutionary paleoecology, and rates of evolution.
- 255 **Quantitative Paleoecology (3)** Staff
Application of univariate and multivariate statistical techniques to solve problems of paleoecology and taphonomy. Uses in other geological and ecological disciplines. Prerequisite: EES 151, Stat 91; or permission of instructor. (Spring, odd years)
- 263 **Sedimentary Environments (3)** Fedo
Study of selected depositional environments, emphasizing terrigenous clastic systems. Field trips as arranged. Prerequisite: EES 126. Laboratory fee (field trips), \$30. (Fall, odd years)
- 266 **Seminar in Sedimentary Geology (3)** Fedo
Treatment of sedimentology and stratigraphic packaging in basins set in different tectonic settings: collisional margin basins, tensional and strike slip basins, continental margin basins and sequence stratigraphy. Prerequisite: EES 122, 126. (Fall, even years)
- 272 **Regional Geology of the Appalachians (3)** Tollo
Integrated analysis of the structural, stratigraphic, and tectonic evolution of the Appalachian orogenic belt through time. Critical evaluation of recent literature and comparisons with other deformed areas of North America and elsewhere. Required field trips provide opportunities to examine key exposures throughout the Appalachian region. (Spring, odd years)
- 275 **Geochemistry of Groundwater (3)** Teng
Application of geochemical principles to the interpretation and prediction of groundwater activity in regional systems. carbonate and silicate equilibrium; weathering and redox reactions; isotopes; and contaminated aquifers. Prerequisite: EES 174 or CE 219 or permission of instructor. (Spring, even years)
- 276 **Advanced Groundwater: Modeling (3)** Staff
Application of numerical models to solving groundwater supply and contamination problems. Model design, boundary conditions, sources, sinks, calibration and strengths and limitations of models. Prerequisite: EES 174 or CE 219 or permission of instructor. A knowledge of a programming language is desirable. (Spring, odd years)
- 280 **High-Temperature Geochemistry (3)** Hanchar
Properties of Earth materials, ceramics, glasses, new materials, radioactive waste materials, crystal growth, dissolution, and mass transfer. Problem solving with geochemical tools. Prerequisite: EES 111, 140.
- 295 **Research (arr.)** Staff
Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit. (Fall and spring)

299-300 Thesis Research (3-3)**398 Advanced Reading and Research (arr.)**

Staff

Staff

Limited to students preparing for the Doctor of Philosophy general examination.
May be repeated for credit.

399 Dissertation Research (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

ECONOMICS

Professors J.L. Gastwirth, R.M. Dunn, Jr., R.S. Goldfarb, A.M. Yezer, J.J. Cordes, J. Pelzman, R.P. Trost, B.L. Boulier, H.S. Watson (*Chair*), M.D. Bradley, J.R. Millar, S.C. Smith, A. Klammer (*Research*), P. Labadie, G.L. Kaminsky, D.O. Parsons, R.F. Phillips.
Associate Professors A.S. Malik, F.L. Joutz, M.O. Moore, S.M. Suranovic, S. Joshi, N. Vonortas, C.M. Snyder, D. Ribar, H. Wolf
Assistant Professors V. Fon, J. Soares, D.M. Strvk, R.M. Samaniego
Adjunct Professors J. Hardt, E.H. Solomon, S.N. Kirby

Master of Arts in the field of economics—Prerequisite: (1) a Bachelor of Arts degree with a major in economics or with course work in economics that includes intermediate microeconomic and macroeconomic theory (equivalent to Econ 101, 102 or 217-18); (2) an understanding of basic calculus, equivalent to Math 31-32. Applications are accepted for the fall semester only.

Required: the general requirements stated under Columbian College of Arts and Sciences and completion of one of the following options.

Option A: 30 hours of course work including Econ 203, 204, 205, and 275; two courses selected from Econ 206, 215, 222, 276, 277; and four additional courses chosen in consultation with the Department's M.A. advisor. (These four additional courses come from two clusters—groups of related courses—with two courses from each cluster. An M.A. thesis may be substituted for the two courses in one of these clusters.) Students must earn at least a grade of B- in Econ 203, 204, and 205.

Option B (primarily for those interested in pursuing a Ph.D.): 30 hours of course work including Econ 203, 204, 205, 206, 215, 216, 275; two courses (unless only one is available) fulfilling the requirements of one of the Department's Ph.D. fields (excluding micro and macro theory). Students must earn at least a grade of B- in Econ 203, 204, and 205.

Five-Year Bachelor of Science/Master of Arts in the field of economics—See the Undergraduate Programs Bulletin.

Five-Year Bachelor of Science (Systems Engineering)/Master of Arts in the field of economics—See the Undergraduate Programs Bulletin.

Doctor of Philosophy in the field of economics—The Ph.D. program involves study in two sequential units. Unit I includes satisfactory completion of required course work, and passing the General Examination. This first unit must be concluded within five years after entry into the program. Upon successful completion of Unit I, students are considered for admission to Unit II, the dissertation stage, which must be completed within five years after entry. In all cases, however, the student is expected to complete the doctorate within eight years after admission. Students admitted to the second unit will be recommended by the Department of Economics for the Master of Philosophy degree.

Students must meet the general requirements stated under Columbian College of Arts and Sciences. For Unit I, the requirements include Econ 203, 204, 205, 206, 215, 216, and 275, plus 27 additional credit hours of approved graduate course work, and passing the General Examination in microeconomic theory, macroeconomic theory, and two other fields selected by the student and approved by the doctoral program committee. Examinations are given in the following fields: econometrics, economic development, environmental and natural resource economics, health economics, industrial organization, international economics, labor economics, monetary theory and policy, public finance, regional and urban economics, and Soviet and East European economics.

Examinations: the field examinations that constitute the General Examination are given at least two times per year. The requirements for the microeconomic and macroeconomic theory examinations must be met before any other field examinations may be taken. Students are strongly advised to take the microeconomic and macroeconomic theory examinations within two years of entering the program. To pass the General Examination, stu-

dents must earn a grade of "satisfactory pass" or better in the field examination in microeconomic or macroeconomic theory and in one of the other two field examinations and no grade below "bare pass." Two of the field examinations may be taken a second time with the approval of the department and the dean. No further opportunity to take the examinations is permitted. Substitution of a field examination (in an area not originally chosen by the student) to satisfy the requirements of the General Examination is equivalent to taking a field examination a second time. Students should consult with the professors responsible for their fields and notify the department two months in advance of their intention to take the examinations. If such notification is not given sufficiently in advance, it may not be possible to sit for the examination.

For Unit II, the requirements include formulation of an acceptable dissertation proposal, completion of a dissertation that demonstrates the candidate's ability to do original research, and 24 hours of additional graduate course work, of which at least 12 hours must be dissertation research. Students, including those who have an accepted dissertation proposal, must enroll in a dissertation proposal seminar (Econ 397) in the first semester after promotion to Unit II. Satisfactory performance in the seminar will be equivalent to 3 credit hours of Unit II course work. In cases where knowledge outside the discipline of economics is critical to the student's research field, up to 6 credit hours in Unit II may consist of required courses outside the Economics Department.

Departmental prerequisite: Graduate courses in economics (except 214, 217-18, 219, 220, 221-22, 247, 249, 250, 280, 283, 284) are designed for graduate students in economics. Graduate students in other disciplines may register for third-group courses after having completed Econ 217-18, or 218 and 219, or 101 and 102, unless the course description indicates that these prerequisites have been waived. Intermediate-level micro and macro courses taken elsewhere usually satisfy this requirement, but introductory or first-year courses do not. In addition to these prerequisites and any others specific to the particular course, calculus is required in some sections of graduate economics courses.

Courses at the 300 level are offered as the demand warrants and may be repeated for credit.

- 202 History of Economic Thought (3)** Staff
Critical analysis and interpretation of the development of economic theory from Plato through the formulation of the Neoclassical Synthesis paradigm and contemporary revisions of the Neoclassical Synthesis. (Fall)
- 203-4 Microeconomic Theory (3-3)** Fon, Joshi
Econ 203: Demand, production, cost theory; prerequisite: Econ 101 or equivalent. Econ 204: Market structure, welfare, general equilibrium; prerequisite: Econ 203. (Academic year)
- 205 Macroeconomic Theory I (3)** Bradley, Joutz, Labadie
Alternative theories of income, employment, and the price level; fiscal and monetary policy impacts; the role of expectations in the economy. (Spring)
- 206 Macroeconomic Theory II (3)** Bradley, Joutz, Labadie
Continuation of Econ 205. Extensions of alternative models of income determination; application of analytic frameworks to the U.S. economy; examination of uncertainty and policy strategy. (Fall)
- 208 National Income, Product, and Productivity (3)** Staff
Output, input, and productivity relationships by industry; income, outlay, flow-of-funds, and balance sheets by sector; uses of accounts for analysis and projections. (Fall)
- 214 Survey of Mathematical Economics (3)** Fon
For graduate students in fields other than economics. Differentiation, partial differentiation, and economic optimization problems; comparative statics; input-output analysis; difference, differential equations, and economic applications. Prerequisite: one semester of calculus and Econ 217-18.
- 215-16 Mathematical Economics (3-3)** Fon
Formulation and application of mathematical models in economic theory. Prerequisite: a one-year calculus sequence. Open to undergraduates with permission of instructor. (Academic year)
- 217-18 Survey of Economics (3-3)** Goldfarb, Watson, Bradley,
Fon, Joutz, Malik, Phillips
Intermediate-level microeconomic theory (Econ 217) and intermediate-level macroeconomic theory (Econ 218) for graduate students in fields other than economics. (Econ 217 and 218—fall and spring)

- 219 **Managerial Economics (3)** **Boulrier, Fon, Goldfarb**
Intermediate microeconomic theory, with emphasis on production and costs, market structure and pricing, risk analysis, and investment theory and capital budgeting. Credit can be earned for only one of Econ 217, 219, and 220. (Fall and spring)
- 220 **Managerial Economics for MBAs (2)** **Boulrier**
Intermediate microeconomic theory, with emphasis on production and costs, market structure and pricing, risk analysis, and investment theory and capital budgeting. Credit can be earned for only one of Econ 217, 219, and 220. (Fall and spring)
- 221 **Economics in Policy Analysis (3)** **Cordes**
Same as PPol 204.
- 222 **Benefit-Cost Analysis (3)** **Cordes**
The application of microeconomic theory and welfare economics to the empirical evaluation of public policies and programs. Applied welfare economics as a framework for policy analysis; empirical measures of welfare change; techniques of benefit-cost analysis. Prerequisite: Econ 217 or equivalent; recommended: Econ 221.
- 223-24 **Monetary Theory and Policy (3-3)** **Labadie**
Theory of monetary policy within the framework of contemporary American central banking. (Academic year)
- 233 **Urban and Rural Development Policies (3)** **Staff**
Review of urban and rural development strategies in the LDCs. Theories and experiences of land reform, peasant cooperatives, small-farm technology, rural-urban linkages, and planning a service network. (Fall)
- 237 **Economics of the Environment and Natural Resources (3)** **Malik**
Analysis of public policy problems relating to the environment and natural resources development and management. Prerequisite: Econ 217. (Spring)
- 239 **Economics of Defense (3)** **Staff**
Economic analysis applied to national security planning and objectives. Analysis of defense establishment problems, including manpower, the defense industry base, procurement policy. (Spring)
- 241-42 **Labor Economics (3-3)** **Goldfarb, Ribar**
Theory of wages and employment, analysis of labor supply and demand. Analysis of unemployment; unions; wage regulation. Econ 241 is prerequisite to Econ 242. (Academic year)
- 245-46 **Industrial Organization (3-3)** **Kwoka, Snyder**
Econ 245: Economic theory and evidence regarding industrial market structure, conduct, and economic performance. Econ 246: Economic issues in antitrust and government regulation of the U.S. economy. Econ 245 is prerequisite to Econ 246. (Academic year)
- 248 **Health Economics (3)** **Baily**
Demand for medical care; organization of the health care delivery industry; policy issues on regulation, efficiency, and allocation of health care services. (Fall)
- 249 **Industrial Organization—The Telecommunication Industry (3)** **Brock**
Principles of industrial organization, welfare economics, and theories of regulation, in theory and in practice. Market power, merger analysis, vertical relationships, entry, and regulation of price and lines of business. The study of market performance and business practices of the telecommunication industry. Prerequisite: Econ 101, 217 or equivalent. Offered off campus only.
- 250 **Survey of Economic Development (3)** **Smith**
An introduction to economic problems faced by less developed countries. Emphasis placed on applications to policy-making and evaluation. Prerequisite: Econ 217 or 280 or equivalent. (Spring)
- 251 **Development Economics I (3)** **Smith**
The application of economic theories, empirical studies, and policy issues to economics problems of developing countries, with an emphasis on microeconomic aspects. Topics include income distribution and poverty, urban migration, peasant and agrarian efficiency, fertility preference, industrial policy, multinational enterprise, and international trade policy. (Fall and spring)
- 252 **Development Economics II (3)** **Smith**
Continuation of Econ 251, with an emphasis on macroeconomic aspects. Topics include new theories of economic growth and general theories of the

- development process, macroeconomic stabilization, financial repression and deepening, debt and aid policies, and applied economy-wide policy models. (Fall and spring)
- 255 **Economics of Technological Change** (3) Vonortas
Economics of research and development; innovation and growth; the role of government in the development and use of new technology. (Spring)
- 257 **Regional Economics** (3) Yezer
Study of regional planning and growth models, including input-output, programming, and econometric models used by planning agencies; analysis of interregional production, trade, migration, firm location, and pricing models. (Fall)
- 258 **Urban Economics** (3) Yezer
Analysis of spatial relationships among economic activities within an urban area including the urban land, labor, and housing markets; urban transportation models; fiscal relationships among jurisdictions. Prerequisite: Econ 257 or permission of instructor. (Spring)
- 263 **Public Finance I** (3) Cordes, Watson
Theoretical and empirical analysis of the economic role of the public sector and the effects of public expenditures on resource allocation and income distribution. Topics include public goods, externalities, social insurance, and benefit-cost analysis. (Fall)
- 264 **Public Finance II** (3) Cordes, Watson
Theoretical and empirical analysis of the effects of taxes and transfers on the allocation of resources and income distribution. Topics include partial and general equilibrium models of tax incidence, effects of taxes on labor supply, saving, and portfolio choices of households and on investment and financing decisions of firms. (Spring)
- 267 **Economies of the Former Soviet Union and Eastern Europe** (3) Pelzman
Analysis of current economic problems. Topics include industrial policies and investment cycles in planned economies, trade relations between the former Soviet Union and Eastern Europe, and comparative analysis of economic policies in the former Soviet Union, Eastern Europe, and less-developed market economies. Admission by permission of instructor. (Fall)
- 268 **Economies of the Former Soviet Union and Eastern Europe in Transition** (3) Pelzman
Analysis of the transition from centrally planned market economies in the former Soviet Union and Eastern Europe. Admission by permission of instructor. (Spring)
- 269-70 **Economy of China** (3-3) Staff
Econ 269: Analysis of organization, operation, policies, and problems. Development of the economy since 1949. Econ 270: Examination of critical problems of development. Prerequisite to Econ 270: Econ 269 or permission of instructor. (Academic year)
- 271 **Economy of Japan** (3) Staff
Analysis of Japanese economic institutions and their contribution to Japan's development. (Fall)
- 275 **Econometrics I: Introduction** (3) Trost, Phillips
Single-equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Topics include heteroscedasticity, serial correlation, and lagged dependent variables. Prerequisite: Econ 123. Some exposure to matrix algebra is helpful, but not required. Same as Stat 275. (Fall and spring)
- 276 **Econometrics II: Simultaneous-Equation Models** (3) Trost, Phillips
Simultaneous equation models of economic behavior. Optional topics are maximum-likelihood estimation, limited dependent variables, and quantum-response models. Prerequisite: Econ 275. Recommended: a course in matrix algebra. Same as Stat 276. (Spring)
- 277 **Laboratory in Applied Econometrics** (3) Trost, Joutz, Phillips, Ribar
Application of econometric theory and the use of econometric software; students are required to write an empirical research paper. The course usually deals exclusively with either micro or macroeconomic issues. May be repeated for credit provided the topic differs.

- 278 **Economic Forecasting (3)** Joutz
Introduction to the theoretical and applied aspects of economic forecasting. Topics include the role of forecasting, univariate time-series analysis, single equation models, multiple series models, and evaluation of forecasts. Prerequisite: Econ 275 or equivalent or permission of instructor. (Spring)
- 280 **Survey of International Economics (3)** Moore, Suranovic
Introductory-level international trade and finance, primarily for Elliott School students. Topics include the economic effects of trade liberalization and protection, exchange rate determination, and macroeconomic policies in an open economy. Prerequisite: Econ 11-12.
- 281 **International Trade Theory (3)** Moore, Pelzman, Suranovic
International trade theory, including alternative models of the gains from trade and evaluations of the new justifications for protectionism, and analysis of commercial policy, factor flows, and trade and investment with multinational corporations. Prerequisite: most sections require calculus or permission of instructor. (Fall)
- 282 **International Finance and Open-Economy Macroeconomics (3)** Dunn, Pelzman
International finance, including alternative models of balance of payments behavior and adjustment, payments accounting, exchange markets, and alternative exchange-rate regimes. (Spring)
- 283 **Survey of International Trade Theory and Policy (3)** Dunn, Moore, Pelzman, Suranovic
For graduate students in fields other than economics. Survey of international economics and policy; application of comparative advantage and other arguments for trade; impact of trade on a domestic economy; new arguments for protectionism; regional trading blocs. (Fall and spring)
- 284 **Survey of International Macroeconomics and Finance Theory and Policy (3)** Dunn, Moore, Pelzman, Suranovic
For graduate students in fields other than economics. Open-economy macroeconomics; international finance; balance of payments accounting; exchange markets; alternative models of balance of payments determination and adjustment; behavior of flexible exchange rate systems. (Fall and spring)
- 285-86 **Economic Development of Latin America (3-3)** Staff
Econ 285: Diversity of structures of Latin American economies; import substituting industrialization; inflation; problems of underemployment and income distribution. Econ 286: Structure of trade; protection, exports, and economic development; regional and global economic integration; foreign investment, multinational enterprise, and technology transfer. (Academic year)
- 290 **Principles of Demography (3)** Boulier
Introduction to basic demographic perspectives and data; methods for analysis of population size, distribution, and composition; determinants and consequences of population trends. Departmental prerequisite waived. Same as Geog/Soc/Stat 290. (Fall)
- 291 **Methods of Demographic Analysis (3)** Boulier
Basic methods for analysis of mortality, natality, and migration; population estimates and projections; estimation of demographic measures from incomplete data. Departmental prerequisite waived. Same as Geog/Soc/Stat 291. (Spring)
- 295 **Special Topics (3)** Staff
Topics vary, depending on current issues of interest and faculty availability. (Fall and spring)
- 298 **Reading and Research (3)**
Limited to master's degree candidates.
- 299-300 **Thesis Research (3-3)**
- 395 **Advanced Special Topics (3)** Staff
Topics vary depending upon current interests and faculty availability. Open to graduate students in economics. May be repeated for credit.
- 397 **Dissertation Proposal Seminar (3)** Staff
Limited to Doctor of Philosophy candidates in Unit II. Critical analysis of current research. Formulation of a dissertation proposal and development of dissertation research strategies.
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

EDUCATIONAL LEADERSHIP

Professors S.R. Paratore, R. Ferrante, D.H. Holmes, G. Confessore, E.B. Howerton, Jr., I.C. Rotberg (*Research*), M.H. Futrell, R.O. Mueller (*Chair*), W.K. Cummings, E. El-Khawas (*Research*)

Associate Professors W.F. Lynch, H.I. Willett, C.B. Stapp, G.B. Jackson, B.H. Khan, J. Gomez, Y. Nakib

Assistant Professors P. Freitag, J.H. Williams, S.A. McDade, W.A. Brown, V. Torres, M.D. Corry, S.K. Patrick, C.-H. Tu, J.J. Battles, L. Lemasters, N.B. Milman, R.R. Watkins, J.H. Williams

Assistant Professorial Lecturer S. Middlebrooks

Lecturer R.L. Millora

See the Graduate School of Education and Human Development for programs of study leading to the degrees of Master of Arts in Education and Human Development, Master of Education, Master of Arts in Teaching, Education Specialist, and Doctor of Education.

Departmental prerequisite: A bachelor's degree from an accredited college or university is prerequisite to all 200-level courses. With permission of the instructor, undergraduates in their senior year may enroll in 200-level courses.

201-2 International Education (3-3)

Staff

Social and cultural issues in international education. Understanding of multi-cultural, cross-cultural, intercultural, and bilingual education issues in a global context. Educ 201: national cultures, intercultural communication skills, cultural dimensions of learning. Educ 202: community-based programs; social change movements. (Academic year)

203 Comparative Education (3)

Williams

Theoretical foundations of comparative and international education and systematic investigation of the structure and practices of selected representative school systems throughout the world. Emphasis on development of methodologies for comparative study.

204 Policy Issues in International Education: Developing Countries (3)

Williams

Policy development and implementation processes in developing countries; key issues in education. Preparation and presentation of a policy brief; in-depth research on a policy issue in a developing country.

205 International Experiences (1 to 6)

Staff

Travel to a foreign country for specific study and research. Admission by permission of the instructor.

206 American Education: An In-Depth Overview for International Students and Educators (3)

Staff

The nature and organization of American education in a social, historical, and philosophical context; understanding contemporary change and how it is reflected in the education system. (Spring)

207 Telecommunications in Education (3)

Corry

Telecommunication technology in education and training contexts. Students gain practical understanding of networks, wave transmission, fiber optics, satellites, and how these systems support various electronic devices. Prerequisite: Educ 180 or equivalent. (Summer)

212 Quantitative Methods I: Introduction to Measurement and Data Analysis (3)

Holmes, Paratore, Mueller, Freitag

First-level course in social science research methods. Overview of basic measurement concepts, educational and psychological testing, and descriptive data analysis (measures of shape, location, and dispersion; correlation). (Fall, spring, and summer)

214 History of American Education Reform (3)

Jackson and Staff

An examination of how evolving American ideals, social contexts, and ideas about education have propelled and opposed education reform efforts throughout history. (Fall)

220 Experimental Course (arr.)

Staff

Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.

- 221 **Internship: International Education (3)** Williams
Service in an international education institution or related program to enable the student to connect theory to practice. Admission by permission of instructor. (Fall and spring)
- 222 **Museum Studies (3)** Stapp
An overview of the museum as an environment for learning, considering the influence of institutional history and organizational structure on the museum's mission of serving the public. Admission by permission of instructor. (Summer)
- 223 **Museum Audiences (3)** Staff
A survey of the museum's diverse audience, emphasizing implications for effective programming, with attention to audience research. Admission by permission of instructor. (Fall)
- 224 **Communication Skills (3)** Millora
Theory of and practice in the development of communication skills in the museum. Educational concepts; teaching strategies and techniques; institutional liaison and group process. Admission by permission of the instructor. (Summer)
- 225 **Education and Development: Sub-Saharan Africa (3)** Williams
Review and application of the relevant findings of the social sciences to the problems and issues of education and development in Sub-Saharan Africa. (Spring)
- 226 **Internship and Seminar in Museum Education (6)** Stapp
Four-day-a-week placement in education departments in area museums supervised by George Washington University faculty. On-campus seminar includes grant proposal writing. Admission by permission of instructor. (Spring)
- 227 **Museum Evaluation (3)** Stapp, Adams
Evaluation and research methods appropriate to the museum setting. Review of research on museum audiences; designing program and exhibit evaluations. Admission by permission of instructor. (Spring and summer)
- 228 **Selected Topics in International Education (3)** Williams and Staff
Current trends, themes, and issues in international education. Admission by permission of instructor. (Fall)
- 229 **History of Educational Technology (3)** Corry
The development of educational technology and the changes in social values and educational philosophy that have shaped modern applications. (Fall and spring)
- 230 **Managing Computer Applications (3)** Ferrante, Patrick
For managers and prospective managers in education and human services who are concerned with the automation of their operations. Basic principles needed to design, implement, and manage an information system. Admission by permission of instructor. (Spring and summer)
- 231 **Educational Hardware Systems (3)** Corry
Design and implementation of educational hardware systems, including computers, videodisks, networks, video systems, and ITV.
- 232 **Applying Educational Media and Technology (3)** Corry
Theory and practice of educational technology. Key characteristics of different media, principles of application, and issues concerning their appropriate use.
- 233 **Supervised Experience in Education and Human Development Services (3 to 6)** Staff
Admission by permission of instructor. (Fall and spring)
- 234 **Computers in Education and Human Development (3)** Corry
The research and practice surrounding the use of computers in educational and training settings. Students will acquire the practical knowledge necessary to the development and evaluation of computer-related curricula through projects and case studies.
- 235 **Design and Implementation of Educational Software (3)** Corry
Theory and practice of creating educational software: psychological basis of using software in learning; instructional programs; authoring tools; artificial intelligence applications; interactive media. Students design and evaluate an educational program. Prerequisite: Educ 232 or permission of instructor.
- 236 **Critical Issues in Distance Education (3)** Corry
Historical, conceptual, theoretical, and practical issues associated with distance education as a foundation for research and practice in the domain of distance

- education as well as adult learning, educational systems design, and school administration and policy. Prerequisite: Educ 180 or equivalent. (Summer)
- 237 **Instructional Needs Analysis (3)** Corry
An introduction to the role of instructional needs analysis and assessment. The design and development of instruction. Key elements of the instructional design cycle. Prerequisite: Educ 180 or equivalent. (Fall, spring, and summer)
- 238 **Technology and Disabilities (3)** Corry
Assistive technology as it impacts the lives of people with disabilities, including the performance of tasks related to employment, education, and activities of daily living. Prerequisite: Educ 180 or equivalent. (Fall, spring, and summer)
- 239 **Learning Technologies and Organizations (3)** Corry
The role of learning technology in organizations, learning in the workplace, and knowledge management in corporations, schools, and universities. Prerequisite: Educ 180 or equivalent. (Fall, spring, and summer)
- 240 **Proposal Writing (3)** Ferrante
The preparation of proposals for educational, business, and industrial applications, including those submitted for funding. Many styles and formats are illustrated. Each student will prepare a proposal in cooperation with an organization or agency.
- 242 **Fundamentals of Educational Leadership and the Change Process (3)** Staff
Current leadership theory and systems behavior in the context of administrative practice in educational settings. Key elements of leadership and management. The impact of context, culture, power, politics, change, communications, and organizational learning on administration. (Fall)
- 243 **Human Relations Diversity (3)** Staff
Application of current theory and research findings in human relations to staff motivation, change, conflict management, and communication techniques for working with individuals and groups within organizations. (Summer)
- 244 **Managing Multicultural Environments (3)** Staff
Application of multicultural research in identifying key elements for managing diverse school environments, communicating with families, planning professional development activities, and increasing student learning. (Spring)
- 246 **Administrative Issues in Education (3)** Willett, Howerton
The impact of major social, political, economic, and education issues on the role of school leaders and the delivery and quality of programs and services. (Spring)
- 248 **Supervision and Evaluation of Instruction (3)** Willett, Howerton
The roles and functions of educational leaders in the areas of curriculum, staff development, instructional supervision, and evaluation of personnel. Theory and practice to increase teacher effectiveness and improve student learning through supervisory strategies. (Fall)
- 259 **Site-Based Leadership: K-12 (3)** Howerton, Willett
A general introduction to the principalship. Stresses leadership theory, roles, and management tasks in instruction, curriculum, budget, staff development, supervision, interagency services, student learning, and policy considerations. Site-based management and communication within a changing and diverse school environment. (Fall)
- 260 **Supervision in the Elementary and Secondary School (3)** Howerton, Willett
For experienced teachers and administrators. Legal and policy basis for personnel evaluation and supervisory practices. Review of modern supervisory concepts, including practices in schools. Prerequisite: Educ 248. (Spring)
- 265 **Developing World Wide Web Materials for Education (3)** Corry
The design, development, integration, and use of World Wide Web resources in education and training concepts. Prerequisite: Educ 180 or equivalent. (Fall and spring)
- 267 **Master's Practicum in Higher Education Administration (3 to 6)** Ferrante
Supervised practical experience in college student development programs. Admission by permission of instructor. (Fall and spring)
- 268 **Power, Leadership, and Education (3)** El-Khawas and Staff
The nature of power, leadership, and education; the relationship of power to leadership; the essential nature of education in the exercise of power and leadership in a democratic setting.

- 271 Education Policy (3)** Jackson and Staff
An introduction to the policy cycle, policy actors, and how major federal education policies play out at the state and local level. (Fall, spring, and summer)
- 272 Educational Planning (3)** Staff
An examination of the planning movement in education: its historical development and the recent shift in premises, context, and expectations. Different approaches to the planning process; its relationship to the concepts of systems and futurism; participatory, sectorial, and regional aspects; role of research, and overview of main analytical techniques currently in use.
- 273 Foundations of College Student Development (3)** Torres
College student development theories, practices, and problems, including historical overview and human development theories related to college students. (Spring)
- 274 Group and Organizational Theories (3)** Staff
Review of major organizational theories inside and outside higher education, including systems, institutional, cultural, cognitive, environmental, ecological, as well as power and influence.
- 275 School Finance (3)** Staff
The financing of public elementary and secondary education in the United States; current revenue sources, distribution decisions, and trends in the fiscal operations of schools. Litigation, finance policies, and equitable investments of public monies. (Spring)
- 276 School-Community Relations (3)** Willett
The purpose, scope, essential elements, and impact of a successful school-community relations program. Community power structures, the roles of policy and leadership, communication techniques for interacting with various audiences and the media, evaluation of public relations and marketing for educational institutions. (Fall)
- 277 Dynamics of Change (3)** Staff
An analysis of the process of change, particularly as it relates to educational policy. Comparison of theories; analytical tools; historical precedents; examples of federal education policies.
- 278 School Law and Policy (3)** Willett
The legal basis of education and public schools in the United States. Constitutional provisions and federal statutes that guide school law. Legal factors that influence school policy. Consideration of practical school situations for legal implications, development of skills to research legal issues affecting schools, and preventive law measures. (Spring)
- 279 Practicum in Supervision (3 to 6)** Staff
Practical experience in supervision of instruction. Admission by permission of instructor. (Fall and spring)
- 280 Internship in Supervision and Instructional Leadership (3 to 6)** Staff
Service in a school situation directed by the University's faculty and school systems; integration of theory and practice.
- 281 Program Evaluation: Theory and Practice (3)** Jackson
Introduction to the theory of evaluation of social programs, alternative evaluation models, methodologies associated with program evaluation, and political and social contexts of evaluation.
- 282 Administration of College Student Development Services and Programs (3)** Torres
An overview of student affairs administrative practices, including needs assessment, planning models, budgeting, policy development, program development, facility management, evaluation, and team building. Admission by permission of instructor. (Fall)
- 283 Higher Education in the United States (3)** McDade
History, philosophy, scope, purpose, present status, programs, and trends in higher education in the United States. (Fall)
- 284 Administration of Higher Education (3)** Brown, Confessore
Government, organization, and administration of colleges and universities; duties of trustees and administrators. (Spring)

- 285 **Education and National Development (3)** Staff
Examination of the basic assumption that education contributes to national development. In addition to economic growth and civic identity, what constitutes national development in advanced industrial societies and societies moving to industrialism? What role does education play in promoting this process?
- 286 **Interpretation in the Historic House Museum (3)** Stapp
Same as AmSt 286. Seminar integrating advanced practices of museum education with current scholarship in architectural history, material culture, and social history. Extensive use of Washington museum resources. Open to undergraduate and graduate students; admission by permission of instructor. (Fall)
- 287 **Museums and Technology (3)** Staff
Same as MStd 287.
- 290 **Leadership in Higher Education (3)** McDade
Cognitive leadership theory as articulated in higher education: what leadership is, how it works, how it is practiced, how it is considered by scholars and practitioners, and how it is researched. Case studies. Prerequisite: Educ 283, 284.
- 291 **Instructional Design (3)** Corry
Designing, implementing, and evaluating instructional strategies for learners. Assessing needs, writing objectives, selecting curriculum/content, selecting and implementing methods and techniques, selecting appropriate devices and evaluating instruction. Prerequisite: Educ 180 or equivalent. (Fall, spring, and summer)
- 292 **Practicum in Educational Policy Program Evaluation (3 to 6)** Jackson and Staff
Supervised practical experience in field placements. Admission by permission of instructor. Prerequisite: Educ 281. (Fall, spring, and summer)
- 293-94 **Research and Independent Study (1 to 3)** Staff
Individual research under guidance of a staff member. Program and conferences arranged with an instructor. (Academic year)
- 295 **Quantitative Methods II: Research Design and Data Analysis (3)** Paratore, Mueller, Freitag
Required of all GSEHD master's students. Second-level course in social science research methods. Emphasis on research design and inferential data analysis (*t* test, ANOVA, simple regression). Prerequisite: Educ 212 or equivalent. (Fall, spring, and summer)
- 296 **Internship in Educational Technology Leadership (3)** Khan
Students are assigned to a cooperating agency and work in consultation under the guidance of the course instructor. Admission by permission of instructor.
- 297 **Educational Technology Leadership Master's Project (3-6)** Khan
Students design, develop, implement, and evaluate an individual project. Admission by permission of instructor.
- 299-300 **Thesis Research (3-3)** Staff
- 301 **Advanced Study: Ideas, Issues, and Practices in Education (3)** Staff
For precandidates for the Ed.D. Alternative means of responding to the complexities of the educational process. Topics vary but concern education as an individual process and as sociocultural preservation and renewal. May be repeated for credit. (Fall and spring)
- 302 **Quantitative Methods III: Basic Inferential Data Analysis (3)** Paratore, Mueller, Freitag
Required of all GSEHD doctoral students. Topics include one- and two-way ANOVA, correlation, and simple linear regression. Prerequisite: Educ 295 or equivalent. (Fall)
- 303 **Advanced Quantitative Data Analysis (3 to 6)** Mueller
Multivariate analysis methods such as factor analysis and structural equation modeling. Analyses performed with commonly used statistical software packages. (Fall)
- 306 **Quantitative Methods IV: Research Design and Analysis (3)** Holmes, Paratore, Mueller, Freitag
Required of all GSEHD doctoral students. In-depth exploration of sampling strategies, research design selection, instrumentation, and data collection and analysis procedures. Prerequisite: Educ 302 or equivalent. (Spring)
- 307 **Qualitative Research Methods (3)** Staff
A general introduction to qualitative research procedures in social science research. Application of qualitative methods, design, analysis.

- 308 Practicum in Qualitative Research Methods (3)** Staff
The development of data collection and analysis skills through the conduct of field-based qualitative research. Prerequisite: Educ 307.
- 320 The Politics of Education (3)** El-Khawas
Examination of the contextual factors (constitutional, historical, ideological, and economic) as well as specific factors (interest groups and executive leadership) involved in making educational policy. Prerequisite: Educ 271.
- 321 Economics of Education (3)** Nakib
Economic analysis as it pertains to educational systems and their impact on economic growth. Economic aspects of the conduct and evaluation of policy. Economic principles and theories applied to education problems such as productivity and cost analyses. (Spring)
- 322 Education Policy Implementation (3)** Nakib
Mechanisms for implementing policy (regulations, categorical and block grants, tax incentives, etc.); case studies of successful and failed policy implementation; project management tools. Prerequisite: Educ 271 or equivalent. Prerequisite: Educ 271. (Fall)
- 329 Seminar in Program Evaluation (3)** Jackson
Contemporary problems and issues in evaluation of social programs: design, implementation, analysis, and utilization. Prerequisite: Educ 281.
- 331 Personnel Administration (3)** Howerton, Willett
Human resource management: planning, recruitment, selection, placement and induction, staff development, rewards, and negotiations. Issues and legislation that influence personnel functions and policy; communication skills for human resource leadership. (Fall)
- 334 Doctoral Internship in Educational Policy (3 to 6)** Jackson, Boswell
Supervised internship in education or human services settings for advanced doctoral students. (Fall, spring, and summer)
- 340 Methods of Policy Analysis in Education (3)** Futrell, Rotberg
Methods of analysis used in the study of educational policy issues. Case studies on a range of policy issues and trends, including testing and accountability, school finance, school choice, and the federal role. Prerequisite: Educ 295. Prerequisite: Educ 271. (Fall)
- 345 Advanced Studies in Educational Policy Analysis (3)** Rotberg
The process by which federal policy is made and implemented by states and school districts. Case studies. Assumptions and objectives; criteria for assessing effectiveness; and federal, state, and local roles. Prerequisite: Educ 271. (Spring)
- 353 Seminar: Higher Education Administration (3)** Brown, Patrick
- 354 Seminar: Administration and Supervision (arr.)** Staff
- 355 Seminar: Applied Educational Administration (3 to 6)** Staff
Application of the theories and principles of administration to public and private schools. Field experience in a phase of administration and supervision. Admission by permission of instructor.
- 369 School Business Management (3)** Staff
Management and control of the business functions of school districts. Assessing, planning, developing, and presenting educational budgets; the legal contexts affecting school business management. Risk management and school-site budgeting. (Fall)
- 372 Doctoral Internship in Higher Education Administration (3 to 6)** Ferrante
Service in a higher education situation directed by the University and the co-operating institution to integrate theory and practice. Admission by permission of instructor. (Fall, spring, and summer)
- 373 The Community/Junior College (3)** Staff
The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges.
- 374 Current Issues in Higher Education (3)** Patrick, Brown
Prerequisite: Educ 283, 284. (Summer)
- 378 Financing Higher Education (3)** Brown
Analysis of private, state, federal, and other revenue sources; strategic planning, program budgets, and financial methods and practices. (Fall)

- 379 **Administration and Governance of Two-Year Colleges** (3) Staff
A study of the community/junior college, focusing on administrative and governance patterns and national, regional, state, and local influences, as well as the theory and structure of two-year college organization
- 380 **Legal Problems in Higher Education** (3) Torres, Willett
Investigation of legal problems in higher education related to the legal structure of higher education, religious concerns, students, faculty, and academic programs. (Summer)
- 381 **College and University Curriculum** (3) Confessore
Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum. (Summer)
- 382 **Teaching Strategies for Adult Learners** (3) Staff
Designing, implementing, and evaluating instructional strategies for adult learners. Assessing needs, writing objectives, selecting curriculum/content, selecting and implementing methods and techniques, selecting appropriate mediating devices, and evaluating instruction.
- 384 **College and University Governance** (3) Staff
Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284.
- 385 **Problems and Practices in Educational Administrative Organization** (3 to 6) Staff
Application of principles and practices concerned with change and evaluation of educational administration.
- 387 **Internship: Administration** (3 to 6) Willett, Howerton
Service in an educational institution or education-related program directed by the University's faculty.
- 388 **Case Studies in Higher Education Administration** (3) Staff
An analysis of case studies related to administrative functions in colleges and universities.
- 390 **Pre-Dissertation Seminar** (3 to 6) Staff
Required of all departmental Ed.D. degree candidates. Approval of the dissertation research proposal by the dissertation committee is necessary for successful completion of the seminar. Admission by permission of instructor.
- 391 **Dissertation Research** (arr.) Staff
Prerequisite: Educ 390.

ELECTRICAL AND COMPUTER ENGINEERING

Professors W.K. Kahn, R.L. Pickholtz, H.J. Helgert, R.H. Lang, N. Kyriakopoulos, T.N. Lee, E. Della Torre, R.J. Harrington, W. Wasylkiwskyj, N.A. Alexandridis, M.H. Loew, R.L. Carroll, Jr., M.E. Zaghloul, M. Pardavi-Horvath, B.I. Edelson (*Research*), B.R. Vojcic (*Chair*), H. Su (*Research*), D. Nagel (*Research*), J.N. Pelton (*Research*)
Associate Professors D. Saha, K.B. Eom, C.E. Korman, M. Doroslovacki, T. El-Ghazawi
Assistant Professors Z. Guo, S. Subramaniam
Adjunct Professors A. Schneider, W.D. Jackson, G.R. Heidbreder, O.S. Mazzoni, W.W. Wu, A.F. Ghais, D.M. Le Vine
Adjunct Assistant Professor S. Ahmadi
Professorial Lecturers A.K. Mehrotra, J.B. Williamson, P.C. Hershey
Associate Professorial Lecturers E.A. Walker, J.J. Knab, M.R. Berman
Assistant Professorial Lecturers G. Mitchell, B.K. Yi, M.P. Carley, A. Goldschen, U.D. Patel

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees.

- 201 **Microcomputer Systems Architecture** (3) Alexandridis and Staff
CISC, RISC microprocessors. Superpipelined and superscalar processors. Buses, timing, and system interface protocols. Advanced memory designs. Multi-level cache designs. Architectural support for memory management, protection, task switching, and exception handling. Multiprocessor systems. Prerequisite: ECE 181, 182, or permission of instructor. (Fall and spring)
- 202 **Linear Systems Theory** (3) Kyriakopoulos and Staff
Introduction to linear systems theory. Topics include linear vector spaces and linear operators, mathematical representation of dynamic linear systems, concept of state and solution of the state equation, controllability and observabil-

- ity, canonical forms of the state equation, state feedback, and state estimation. (Fall)
- 203 Stochastic Processes in Engineering (3)** Pickholtz and Staff
Basic concepts of modeling of random phenomena in electrical and computer systems: probability framework, stationarity, linear filtering, Optimization of discrete and continuous stochastic processes, Elements of performance analysis. Prerequisite: ECE 12, ApSc 115, or equivalent. (Fall and spring)
- 204 Embedded Systems (3)** Alexandridis and Staff
Embedded microprocessors, Real-time systems, Multithreaded process scheduling, Exception handling, Embedded control software and tools, Interfacing methods and interrupt synchronization, Embedded RISC controllers and cores, Microcomputer-based data acquisition and control systems. Prerequisite: ECE 201 or permission of instructor. (Fall and spring)
- 205 Fractals and Their Applications (3)** Loew
Contemporary methods in fractal analysis, Basic mathematics of fractals: fractal dimension; fractional Brownian motion (fBm) and generalized dimensions/iterated function systems; fractal interpolation functions, fractal dimension in 3D, Morphology, Models and image compression, Student research projects. Prerequisite: ECE 203 and either 211 or 219. (Spring, even years)
- 206 High-Performance Processors (3)** Alexandridis and Staff
Instruction-level parallelism in superscalar processors, Multiple-instruction fetching, aligning, merging, and issuing, Hardware and software solutions to data dependencies and control hazards, Branch prediction and static and dynamic speculation, Register renaming, reorder buffers, Tomasulo, software pipelining, VLIWs, EPIC. Prerequisite: ECE 201 or permission of instructor. (Spring)
- 208 Digital Image Processing (3)** Loew and Staff
Properties of images and visual systems, Image acquisition, sampling, quantization, One- and two-dimensional image transform techniques; enhancement and restoration, Image coding and data compression, Segmentation, representation, boundary and shape, texture, matching, Image understanding, Computer applications and projects. Prerequisite: ECE 202. (Spring, odd years)
- 209 Compression Techniques for Data, Speech, and Video (3)** Eom
Lossless and lossy coding theorems, rate distortion bound, Data compression algorithms: Huffman coding, run-length coding, Differential coding, Transform coding, Voice, audio, image and video coding techniques: CELP, JPEG, MPEG, MP3, Data coding standards: G.722, G.726, G.728, H.261, H.323. Prerequisite: ECE 203, 211, or permission of instructor. (Fall)
- 210 Applied Electromagnetics (3)** Lang and Staff
Review of Maxwell's equations: electromagnetics of circuits, plane wave propagation; transmission lines; waveguides, radiating systems; receiving antennas and pattern reciprocity, array antennas; electromagnetic properties of materials: conductors, crystals, devices; optical transmission. Prerequisite: ECE 32; ApSc 114. (Fall and spring)
- 211 Signals and Transforms in Engineering (3)** Wasylkiwskyj and Staff
Representation of discrete and analog signals as sums of canonical elementary functions; normal equations and the LMS approximation theory, singular value decomposition for discrete and continuous signals; application of classical transform theory; application of wavelets to data compression and numerical analysis. Prerequisite: ECE 12; ApSc 114 or equivalent. (Fall and spring)
- 213 Modeling of VLSI Circuits (3)** Zaghloul and Staff
Top-down ASIC-FPGA design methodology, Modeling of VLSI circuits using HDL, Behavioral, structural, and RTL modeling techniques; validation and verification techniques, Introduction to logic synthesis, Intellectual property usage, Students design and simulate a project using state-of-the-art commercial VLSI CAD tools. Prerequisite: ECE 126. (Fall)
- 214 High-Level VLSI Design Methodology (3)** Zaghloul and Staff
High-level ASIC-FPGA design methodology, RTL modeling of VLSI circuits, using HDL for synthesis, Detailed discussion of logic synthesis, Architectural tradeoff for large VLSI circuits, Advanced optimization techniques, VLSI design flow, using the state-of-the-art, front-end design entry and simulation tools and back-end logic synthesis. Prerequisite: ECE 213. (Spring)
- 215 Introduction to MEMS (3)** Zaghloul and Staff
Introduction to MicroElectroMechanical Systems, Microfabrication techniques, bulk micromachining, surface micromachining, Examples of mechanical sen-

- sors and actuators, examples of microsystems, interface circuits and MEMS applications. Use of the CAD tools to design MEMS devices. May be taken by undergraduates. Prerequisite: ECE 126 or permission of instructor. (Fall)
- 216 **Mixed Signal Design (3)** Zaghoul and Staff
Analog signal processing families, discrete time switched capacitor circuits, A/D and D/A converters, samples, modulators, oscillators, and system level circuit design. Prerequisite: ECE 126 or permission of instructor. (Spring, even years)
- 217 **Neural Networks (3)** Zaghoul and Staff
Theory of neural network models, relation to biological models. Examples of known models. Possible applications of neural networks. Neural network VLSI implementations, digital vs. analog approaches. Building blocks. Examples on realized neural networks. (Fall)
- 218 **Analog VLSI Circuit Design (3)** Zaghoul and Staff
MOS technology: building blocks, devices, capacitors, limitations. Operational amplifiers and other analog systems. Layout examples and design principles. Students use the CAD VLSI laboratory to design and simulate circuits. Prerequisite: ECE 126 or equivalent. (Spring, odd years)
- 219 **Computational Techniques in Electrical Engineering (3)** Vojcic and Staff
Introduction to linear algebra and vector spaces as applied to networks and electrical systems. Orthogonal bases, projections, and least squares. Fast Fourier transforms. Eigenvalues and eigenvectors with applications. Computations with matrices. Constrained optimization in electrical systems. Network models and applications. Prerequisite: ECE 12, ApSc 114. (Fall and spring)
- 220 **Pattern Recognition (3)** Loew and Staff
Random vectors, transformations. Hypothesis testing, error probability, sequential methods. Bayes, other linear classifiers. Parameter estimation, learning, and dimensionality reduction. Nonparametric methods; clustering; feature selection and ordering. Syntactic methods; grammatical inference. Computer applications and projects. Prerequisite: ECE 203. (Fall, odd years)
- 221 **Physical Electronics (3)** Pardavi-Horvath and Staff
Theoretical principles underlying the operation of electronic devices. Postulates of quantum mechanics: wave-particle duality, uncertainty relations, Particle statistics. Phonons. Electronic band structure. Metals and semiconductors. Physical principles of semiconductor and optoelectronic devices, lasers, superconductors. Prerequisite: ECE 210. (Spring, odd years)
- 223 **Photonic Communication Devices (3)** Wasylkiwskyj and Staff
Semiconductor laser fundamentals, quantum mechanics of semiconductor medium: single-mode tunable laser diodes, distributed Bragg reflector laser, distributed feedback laser diodes, doped fiber amplifiers; generation, transmission, demodulation and detection of optical signals, link budget estimates. Prerequisite: ECE 226 or permission of instructor. (Spring, odd years)
- 224 **Electronics of Lasers (3)** Kahn and Staff
Basic concepts from quantum mechanics, Einstein coefficients, inversion and pumping mechanisms, rate equations. Resonators, He-Ne laser; organic dye lasers, injection lasers. Nonlinear interactions in lasers. Prerequisite: ECE 221 or equivalent. (Fall, even years)
- 225 **Device Electronics (3)** Korman and Staff
Semiconductor device concepts; impurity doping, drift diffusion, recombination. Analysis of Schottky and Ohmic contacts, *pn* junctions, MOS systems. Modeling and analysis of semiconductor devices such as MOSFET, JFET, and bipolar transistors. Numerical modeling of semiconductor devices to CAD of VLSI circuits. Prerequisite: ECE 121 or equivalent. (Spring, even years)
- 226 **Fiber and Integrated Optics (3)** Wasylkiwskyj and Staff
Propagation of light in optical fibers and planar waveguides, absorption and material dispersion effects, polarization, birefringence, spatial and temporal coherence. Components in fiber optic networks: directional couplers, power splitters, tunable filters and diffraction gratings. Prerequisite: ECE 210. (Spring, odd years)
- 227 **Data and Computer Communications (3)** Alexandridis and Staff
Connecting computers into distributed systems. Computer networks: Local and wide-area networks. Networks of workstations. Internetworking and protocols. Open systems. Programming and software issues. Distributed applications and databases. Prerequisite: ECE 188, 201. (Spring)

- 230 Microarchitectures for Multimedia Processing (3)** Alexandridis and Staff
Multimedia architecture and acceleration. Multimedia instructions. Multimedia data (speech, audio, image and video): processing and interfacing requirements. Audio and video compression: algorithms, standards, and hardware design. Parallelism in multimedia processing. Prerequisite: ECE 181, 201 or permission of instructor. (Spring)
- 231 Fault-Tolerant Systems (3)** Zaghloul
Fault-test generation for combination and sequential circuits, digital simulation as a diagnostic tool, design of easily tested and fault-tolerant systems. Prerequisite: ECE 182. (Fall, odd years)
- 232 Applied Magnetism (3)** Pardavi-Horvath and Staff
Classification of magnetic materials. Magnetic measurements. Soft and hard magnetic materials. Applications to microwave, magnetic recording, permanent magnets, magneto-optics, magnetostrictive devices. Magnetic sensors. Electric power. Superconducting devices. Prerequisite: ECE 210. (Spring, odd years)
- 233 Introduction to Microwave Engineering (3)** Kahn and Staff
Transmission lines and waveguides, microwave networks, scattering parameters, filters and coupling structures, implementations in stripline microstrip and coplanar guiding structures, active microwave circuits, characteristics of microwave transistors, design of microwave amplifiers and oscillators, microwave transmitters and receivers. Prerequisite: ECE 210. (Fall, even years)
- 234 Wave Propagation (3)** Wasyliwskyj and Staff
Electromagnetic and acoustic propagation in inhomogeneous media, WKB approximation, geometrical optics, layered media. Stationary phase and steepest descent evaluation of integrals; application to field computation at caustics. Prerequisite: ECE 236. (Spring, even years)
- 235 Antennas (3)** Kahn and Staff
Fundamental properties: gain, directivity, efficiency polarization, antenna reciprocity; radiation from prescribed current distributions, Fresnel and Fraunhofer approximations; wire, loop, horn, helical antennas; microstrip patch antennas; theory and design of antenna arrays; antennas for mobile communication systems. Prerequisite: ECE 210. (Spring, odd years)
- 236 Electromagnetic Radiation and Scattering (3)** Wasyliwskyj and Staff
Electromagnetic scattering by simple shapes, asymptotic high-frequency approximations, creeping waves, geometrical theory of diffraction. Approximation techniques in radiation and scattering, Rayleigh and Born approximations. Prerequisite: ECE 210, 211, 219. (Spring, odd years)
- 237 Waves in Random Media (3)** Lang and Staff
Propagation and scattering of electromagnetic, optical, and acoustic waves in random media, scattering from rough surfaces and randomly distributed particles, turbulence. Applications to propagation through rain and fog. Laser beam scintillations, remote sensing, and communications channel modeling. Monte Carlo simulation. Prerequisite: ECE 203, 236. (Fall, odd years)
- 238 Remote Sensing (3)** Lang and Staff
Active and passive remote-sensing systems: scatterometers, real-aperture imaging, and synthetic-aperture radars. Sensing of surface, subsurface, and atmospheric parameters at microwave, infrared, and optical frequencies. Analysis of radiometric techniques using radiative transport theory, inverse scattering methods, profile inversion. Prerequisite: ECE 210. (Spring, even years)
- 239 Numerical Electromagnetics (3)** Wasyliwskyj
Numerical methods for the solution of electromagnetic scattering and radiation problems. Major techniques: method of moments, T-matrix and finite element methods, geometrical theory of diffraction and hybrid approaches to solve scattering and radiation by wire structures, surfaces, and composite bodies. Prerequisite: ECE 210, 211, 219. (Spring, odd years)
- 241 Information Theory (3)** Saha and Staff
The concepts of source and channel. Measure of information, entropy, mutual information. The noiseless coding theorem. The noisy coding theorem. Channel capacity: symmetric and nonsymmetric channels. Gaussian and binary symmetric channels. Rate-distortion theory. Basics of multiple-user information theory. Prerequisite: ECE 203. (Fall, even years)
- 242 Coding Theory (3)** Saha and Staff
Linear codes: parity and generator matrices, syndrome error correction and detection capability, minimum distance. Performance bounds of linear codes.

- Hamming and Golay codes, Galois fields, shift-register implementation. Cyclic codes. BCH codes: the BCH decoding algorithm, burst-correction codes. Prerequisite: ECE 203. (Spring, even years)
- 243 **Communication Theory I (3)** Pickholtz and Staff
Principles of digital communications. Channels, digital modulation; optimum receivers and algorithms in the AWGN; coherent, non-coherent, and fading channels. Correlation detectors, matched filters, channel state estimation; diversity. Bounds on performance, comparison of communications systems. Prerequisite: ECE 203 or equivalent. (Fall and spring)
- 244 **Communication Theory II (3)** Pickholtz and Staff
Advanced techniques for digital communications. Algorithms for maximum performance in noise, interference, band-limited, and fading channels. Trellis codes, turbo codes; decoding by Viterbi, sequential, and MAP algorithms. Bounds on performance. Current literature on multi-access and space-time methods. Term paper. Prerequisite: ECE 243. (Spring)
- 245 **Statistical Signal Estimation (3)** Doroslovacki and Staff
Minimum variance unbiased estimation. Cramer-Rao bound, statistical modeling, sufficient statistics, maximum likelihood estimation, efficient estimators, least squares, Bayesian estimators. Wiener and Kalman filters, complex data and parameters. Applications to radar, speech, image, biomedicine, communications, control. Prerequisite: ECE 203, 211, 219. (Fall, odd years)
- 246 **Digital Communications (3)** Vojcic and Staff
Analysis and design of digital communications systems for voice, video, and data. Digital coding of waveforms: Nyquist criteria, intersymbol interference (ISI). Partial response signaling. Practical considerations in design of signals for modems and recording media. Digital switching and integrated services digital networks. Prerequisite: ECE 244. (Fall, odd years)
- 247 **Communications Systems (3)** Vojcic and Staff
Digital communications systems. Generation of carrier phase references using phase-locked loops (PLL). Optimum design of PLL. Maximum-likelihood estimation of carrier phase and symbol timing. Performance degradation. Applications to PCM, TDMA, and spread-spectrum systems. Prerequisite: ECE 244 or equivalent. (Spring, even years)
- 248 **Introduction to Computer Networks (3)** Pickholtz and Staff
Fundamental communications network concepts. Architectures for access and internetworking. Data and multimedia transmission techniques, protocols; switched and shared media networks. Routing, error, and flow control; TCP/IP and other Internet protocols. New developments in next-generation Internet. Prerequisite: ECE 144. (Fall and spring)
- 249 **Network Performance Analysis (3)** Pickholtz and Staff
Telecommunications traffic models: arrival and service time distributions. Poisson and Erlang formulas. Topological design algorithms. Delay and blocking models and probabilities for packet switched networks. Routing, relaying, and flow control algorithms: delay and cost minimization, throughput optimization. Multiple access. Prerequisite: ECE 203 and either 248 or 260. (Spring)
- 250 **Telecommunication Network Security (3)** Helgert and Staff
Speech and data scrambling. Linear and nonlinear transformations. Cryptographic techniques. Block and stream ciphers. The Data Encryption Standard (DES). Key management, digital signatures, message authentication, hash functions. Public key algorithms. Prerequisite: graduate standing. (Fall, odd years)
- 251 **Telecommunication Switching Systems (3)** Helgert and Staff
Circuit, packet and cell switching. Routing and relaying. Space and time division switching. Switching networks. Storage, delay, blocking and complexity. Digital cross connects, add/drop multiplexers. Digital switching systems. Network timing and synchronization. In-band and common channel signaling networks. Signaling System #7. Prerequisite: ECE 249. (Spring, odd years)
- 252 **Digital Signal Processing Techniques (3)** Kyriakopoulos and Staff
Signal and system representation, sampling and quantization, transform techniques. Recursive and nonrecursive digital filter design, recursive estimation, linear predictive filtering. Fast algorithms for signal processing. Current topics. Prerequisite: ECE 117 or 211, and 203. (Fall)
- 253 **Mobile Communication Systems (3)** Vojcic and Staff
Mobile channel characterization. Modulation and coding techniques. Code division multiple access. Fading countermeasures; coding, equalization, and mul-

multiple transmit/receive antennas. Power control. Capacity of cellular and ad hoc networks. Structure and evolution of mobile communications networks. Evolving technologies and standards. Prerequisite: ECE 243. (Spring, even years)

254 Radar Systems (3)

Lang and Staff

The radar range equation. Radar cross section of targets, target detection and parameter estimation, detection in clutter. Resolution, ambiguities, and signal design. Moving-target indicators. Pulse Doppler radar. Radar antennas, phased arrays. Synthetic aperture and space-based radar. Prerequisite: ECE 210. (Fall, odd years)

255 Optical Communication Networks (3)

Subramaniam and Staff

Wave propagation through fiber, dispersion, polarization. Multiplexing techniques, WDM. Optical networking components. Optical transmission systems design. All-optical networking, broadcast star and wavelength routing networks. Performance analysis, survivability, control and management. Optical access networks. Prerequisite: ApSc 115 or permission of instructor. (Fall)

256 Wavelets and Their Applications (3)

Doroslovacki

Time-frequency analysis. Continuous, discrete, and discrete-time wavelet transform. Multirate filter banks. Multiband wavelets, two-dimensional wavelets. Wavelet packets. Wavelets in noise filtering, compression, modeling of fractals, communications, detection, adaptive systems, neural networks, and fast computation. Prerequisite: ECE 211. (Fall, odd years)

257 Multi-User Communications (3)

Vojcic and Staff

Spread-spectrum transmission; direct sequence and frequency hopping. Conventional code division multiple access. Multi-user detection and capacity limits for multi-user communications. High-capacity multi-user communications. Applications to mobile communications and cellular networks. WCDMA, cdma2000, and CDMA/HDR. Prerequisite: ECE 243. (Fall, even years)

258 Propagation and Antennas in Wireless Communications (3)

Lang and Staff

Wireless communication channel modeling, properties of electromagnetic waves, propagation mechanisms, antenna fundamentals, terrestrial fixed links, satellite fixed links, macrocells, fading models, microcells, picocells, diversity, equalizers, adaptive antennas. Prerequisite: ECE 32 and ApSc 115, or equivalent. (Spring, odd years)

259 Wireless Networks (3)

Vojcic and Staff

Wireless channels and transmission fundamentals. MAC and link layer protocols for wireless networks. Cellular systems: GSM/GPRS, IS-95 and IMT-2000. Satellite systems. Broadcast systems. Wireless LANs: IEEE 802.11, HIPERLAN and Bluetooth. Wireless ATM. Mobile IP and TCP. Ad hoc networks. Mobility support: World Wide Web and WAP. Prerequisite: ECE 144. (Fall, even years)

260 Information Transmission Systems (3)

Helgert and Staff

Transmission media, signals, channels, noise. A/D conversion, data compression, information exchange codes. Carrier modulation, modems and standards. Baseband transmission and codes, synchronization and timing. Multiplexing. Inverse multiplexing. Transmission impairments, error control. DSL systems. Prerequisite: ECE 143 or equivalent or graduate standing. (Fall)

261 Electromechanical Energy Conversion (3)

Harrington and Staff

Characteristics of synchronous machines, synchronous reactance, reactance theories, synchronizing generators and parallel operation of machines, characteristics of asynchronous machines, machines as circuit elements. Steady-state and dynamic performance of alternating current machines. Prerequisite: ECE 177 and permission of course director. (Fall, odd years)

262 Power Electronics (3)

Harrington and Staff

Types of power converters and switching matrices. Existence functions and their representation. Control variables. Review of power semiconductor switching devices. Analysis of DC-DC, AC-DC, and AC-AC converters. Circuit interfacing, commutation and control. Prerequisite: ECE 178 and permission of course director. (Spring, even years)

263 Applications of Power Electronics (3)

Harrington and Staff

Analyses and design of DC and AC variable speed motor drives. Converter topology and switching devices. Detailed performance analysis. Computer modeling of converters. Methods of converter control. Power system applications to generation, transmission, and storage. Prerequisite: ECE 262 or permission of course director. (Spring, even years)

- 264 **Direct Electrical Energy Conversion (3)** Harrington and Staff
Direct generation and storage of electricity based on charged carrier transport in solid, liquids, and gases. Thermodynamic limitations and the Carnot cycle. Band theory and electrical conduction in semiconductors. Photovoltaic devices and thermoelectric potentials. Electromagnetic turbines and thermionic converters. Prerequisite: Permission of course director. (Spring, odd years)
- 265 **Transients in Electrical Power Lines (3)** Harrington and Staff
Switching and lightning surges and the resultant overvoltages on long lines. Breaker closing sequence effects and effect of source side inductance and multiple infeeds. Recovery voltage after short line faults. Methods and effectiveness of protection. Calculation of overvoltages and insulation level requirements. Prerequisite: Permission of course director. (Spring, even years)
- 266 **Power System Control and Stability (3)** Harrington and Staff
EHV AC power transmission, load flow, automatic generation control, economic dispatch, voltage instability, steady state stability, dynamic stability, machine modelling, exciter and governing systems, frequency and voltage control, contingency analysis. Prerequisite: ECE 178 or permission of course director. (Fall, even years)
- 267 **Power System Operation and Planning (3)** Harrington and Staff
Real time load flow, security assessment, advanced contingency analysis, islanding and system state classification, system restoration, power system reliability, generation and transmission planning, load forecasting, unit commitment, planning with economic and reliability constraints. Prerequisite: ECE 266 or permission of course director. (Spring, odd years)
- 268 **Electrical Power Distribution (3)** Harrington and Staff
Transformer and insulation design at distribution voltage levels. Medium- and low-voltage switchgear requirements. Protective relaying, harmonic filtering, power-factor correction, grounding systems. Prerequisite: ECE 178 and permission of course director. (Spring, odd years)
- 269 **Engineering Resources and Environmental Issues in Electrical Power (3)** Harrington and Staff
Introduction to engineering issues involved in selecting electrical power systems. Primary resources. Worldwide distribution. Relation to the developing alternate technology base for power. Environmental, social, economic, and educational considerations. Impact of changing regulations. Prerequisite: Permission of course director. (Fall, odd years)
- 270 **Protection for Power Systems (3)** Harrington
Typical protective relay systems. Directional sensing of faults. Backup and line protection of generators; transformers; reactors; shunt capacitors; bus, motor, and long EHV series-compensated lines. Stability, reclosing, and load shedding. Systems swings, grounding, and transient overvoltage protection. Prerequisite: ECE 178 and permission of course director. (Fall, odd years)
- 271 **Linear Multivariable Controls (3)** Carroll and Staff
Control of systems having multiple inputs or outputs. Frequency-domain techniques in linear quadratic Gaussian, loop transfer recovery, H_∞ , and Nyquist array design. Prerequisite: ECE 172, 202, 273. (Spring, odd years)
- 272 **Computer Control Systems (3)** Carroll and Staff
Analysis of automatic control systems in which the control procedure uses on-line digital computation. Topics include single- and multirate sampling, z-transforms, responses of discrete systems, stability criteria, and discrete control design. Prerequisite or concurrent registration: ECE 202. (Spring)
- 273 **System Optimization (3)** Carroll and Staff
Parameter optimization problems, theory of minima and maxima. Optimization problems for dynamic systems, calculus of variations, the maximum principle and the Hamilton-Jacobi equation. Optimization problems with constraints, optimal feedback systems. Numerical solution of optimal problems. Prerequisite: ECE 172 or equivalent. (Spring)
- 274 **Nonlinear Systems (3)** Carroll and Staff
Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov asymptotical method, and Tsytkin locus. Forced oscillations—jump resonance. Stability analysis—Liapunov criterion. Lur  problem and Popov method. Prerequisite: ECE 202. (Spring, even years)

- 275 Adaptive Filtering (3)** Doroslovacki and Staff
Adaptation criteria. On-line adaptive filtering algorithms; least mean square and recursive mean square. Adaptation in transform domain. Convergence of adaptive algorithms and tracking. Applications in system identification, adaptive channel equalization, interference cancellation and suppression, and adaptive antenna arrays. Neural networks. Prerequisite: ECE 245. (Spring, even years)
- 276 Design of Robotic Systems (3)** Carroll and Staff
Topics related to robotics: coordinate transformations, kinematics, dynamics of robot manipulator arms, trajectory planning, sensors, internal transmissions, actuators, robot control systems design, vision systems, and programming languages. Prerequisite: ApSc 58, CSci 100. (Fall)
- 277 Satellite Communication Systems (3)** Helgert and Staff
Theory and application of satellite communication. Low earth orbit and geostationary satellite systems. Orbit calculations. Transmission systems. RF link budgets. Modulation and multiplexing. Multiple access techniques: FDMA, TDMA, CDMA. Link budgets. Satellite transponders, antennas, and earth stations. VSAT networks. Satellite packet communications. Prerequisite: ECE 203, 243. (Fall, odd years)
- 278 Local and Metropolitan Area Networks (3)** Helgert and Staff
LAN architectures: topologies, transmission media, bridges, routers, gateways. The LAN Protocol Reference Model, IEEE 802. Multiple access procedures: Aloha, CSMA, token passing, Ethernet and Fast Ethernet, token bus, token ring, FDDI, fiber channel, wireless LAN, ATM LAN's, DQDB. LAN interworking, routing and relaying. Prerequisite: ECE 346 or equivalent. (Spring, odd years)
- 279 Stochastic Control Systems (3)** Lee and Staff
Introduction to random process in control systems. Properties of Markov process, systems of covariance equivalence and of deterministic and stochastic control equivalence; dynamic programming for Markov process—principle of optimality; linear systems with quadratic cost, Kalman filtering, smoothing, and predicting. Prerequisite: ECE 203, 273. (Fall, odd years)
- 280 Anatomy and Physiology for Engineers (3)** Loew and Staff
Human anatomy and physiology from an engineering viewpoint. Analysis of functions of major physiological systems. Biopotentials, mechanics, gas exchange, chemical balance, electrical and chemical signaling, nervous control, voluntary and reflex factors. (Fall)
- 281 Speech and Audio Processing by Computer (3)** Eom
Acoustic sensor technologies and characteristics. Speech coding: waveform coding, voice source coding. Speech enhancement and noise reduction. Speech analysis and synthesis, audio formats and compression standards. Speech recognition: isolated word recognition, continuous speech recognition, language identification. Models for speech and audio. Prerequisite: graduate standing. (Fall)
- 282 Medical Measurements (3)** Guo and Staff
Theory of measurements in biological areas, techniques for electronic measurements on biological specimens. Experiments in acquisition, processing, and measurement of physiological signals, ECG, EEG, and EMG. Prerequisite: ECE 280 or permission of course director. (Fall)
- 283 Medical Instrumentation Design (3)** Guo and Staff
Modern biomedical measurement techniques and instrumentation, including theory of data acquisition, biopotentials, biomedical signal processing, clinical laboratory instrumentation, respiratory system measurements, medical imaging, and prosthetic devices. Prerequisite: ECE 282. (Spring, even years)
- 284 Biomedical Signal Analysis (3)** Loew and Staff
Origin, acquisition, and analysis of physiological signals. Deterministic and probabilistic modeling; fitting models; sequences and time series. Feature extraction from EEG and ECG; Fourier analysis and filtering. Hypothesis testing and design of experiments: sequential and nonparametric pattern recognition. Prerequisite: ECE 282; corequisite: ECE 283. (Spring)
- 285 Medical Ultrasound (3)** Guo and Staff
Modern medical ultrasound techniques and instrumentation, including physics of ultrasound, transducers, ultrasound imaging, hemodynamics, Doppler ultrasound and instrumentation, blood-flow measurements, Doppler signal processing, Doppler imaging, three-dimensional ultrasound imaging, and clinical applications. Prerequisite: ECE 11, 282. (Spring, odd years)

- 286 **Clinical Medicine for Engineers (3)** Loew and Staff
Overview of clinical medicine with emphasis on those areas most affected by engineering and technology. Prerequisite: ECE 280, 282. (Spring, even years)
- 287 **Rehabilitation Medicine Engineering (3)** Loew and Staff
Cross-sectional view of those areas of medicine most involved with the treatment of handicapped individuals. Application of engineering theory and techniques to the rehabilitation of handicapped individuals. Major problem areas and general solutions, solutions to some specific problems. Prerequisite: ECE 280, 282. (Spring, odd years)
- 290 **Wide Area Telecommunications Networks (3)** Helgert and Staff
Traffic characterization: CBR and VBR sources. N-ISDN: physical layer interfaces, data link and network layer protocols. B-ISDN: protocol architecture, physical layer protocols. Frame Relay: protocol architecture, call control, LAPF, congestion control. ATM networks. IP, voice and video over ATM. ATM LAN emulation. Metropolitan Area Networks: DQDB, SMDS. Prerequisite: ECE 346. (Fall, odd years)
- 291 **Physics of Magnetism (3)** Pardavi-Horvath and Staff
Physics of magnetism in solids, with emphasis on magnetic phenomena used in devices. Fundamental properties of magnetic materials. The origins of magnetism, demagnetizing fields, anisotropy, magnetostriction, domains and coercivity. Prerequisite: ECE 210. (Fall, odd years)
- 292 **Magnetic Hysteresis (3)** Della Torre and Staff
Hysteresis models. Decomposition into irreversible and locally reversible magnetization. Aftereffect and accommodation. Vector models. Magnetostriction and magnetothermal effects. Prerequisite: ECE 210. (Spring, even years)
- 293 **Image Synthesis (3)** Eom
Image synthesis techniques, mathematical image models, image reconstruction techniques, color texture synthesis, synthesis of three-dimensional scenes. Prerequisite: graduate standing. (Spring)
- 294 **DSP Embedded Systems (3)** Doroslovacki
Digital signals, binary number representation, fixed-point and floating-point DSP architectures. Q-format for data representation, bit allocation and arithmetic. Portability of arithmetic expressions: floating point vs. fixed point. Applications to signal parameter estimation, signal generation, filtering, signal correlation, spectral estimation (FFT). Prerequisite: ECE 201. (Spring, odd years)
- 297 **Special Topics (1 to 3)** Staff
Topics to be announced in the *Schedule of Classes*. (Fall and spring)
- 298 **Research (arr.)** Staff
Applied research and experimentation projects, as arranged. May be repeated for credit.
- 299-300 **Thesis Research (3-3)** Staff
- 306 **Advanced Topics in Computer Engineering (3)** Alexandridis and Staff
Overview of parallel computing. Compilers/parallelizers. Design of parallel algorithms. Benchmarks. Fault tolerance and load balance. Parallel performance modeling. Vector/matrix products. Interprocess and interprocessor communication. Parallel algorithms for numerical techniques. Prerequisite: CSci 270, ECE 220. (Fall, even years)
- 317 **VLSI for DSP Systems (3)** Zaghoul and Staff
VLSI design techniques as applied to DSP systems. CAD tools and standard library design techniques; algorithms and architectures for DSP systems in VLSI. Systolic arrays; parallel and pipelined architecture in DSP. Transform and digital filter algorithms. Prerequisite: ECE 252. (Spring, odd years)
- 318 **Mobile Networked Computing (3)** Alexandridis and Staff
Microarchitectures for the mobile, handheld, and transport application domain. Collaborative computing. Models of distributed computing systems. Handling locality migration, caching for intermittent connectivity and location-dependent information. Mobile network interface devices. Concurrency. Adaptations for mobile computing. Prerequisite: ECE 201. (Fall)
- 319 **Controls, Systems, and Signal Processing Research (arr.)** Staff
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

- 320 Computer Vision (3)** Loew and Staff
Image processing; edge detection, segmentation, local features, shape and region description in 2D and 3D; Insights from human vision studies. Representation for vision: object models, synthetic images, matching, gaps, algorithms. Interference, production system, syntactic networks. Planning spatial reasoning for robot vision. Prerequisite: CSci 270; ECE 220. (Spring, even years)
- 321 Mathematical Techniques for Electromagnetics (3)** Lang and Staff
Asymptotic methods for Maxwell's equations, geometric optics, WKB approximation for stratified media, uniform expansion near a caustic and shadow boundary. Perturbation techniques for tenuous medium: Rayleigh-Gans approximation, smoothing, and multivariable methods for stochastic problems. Prerequisite: ECE 203, 236. (Spring, every third year)
- 322 Waveguide Diffraction (3)** Kahn and Staff
Selections from the following. Analytical treatment of waveguide bifurcations and discontinuities by Wiener-Hopf, mode matching, static approximation. Small apertures (obstacles) in waveguides. Variational methods for evaluation of equivalent circuit parameters. Group theoretic methods for symmetrical junctions. Prerequisite: ECE 236. (Fall, every third year)
- 323 Principles of Microelectronics (3)** Pardavi-Horvath and Staff
Basic principles, techniques, and processes necessary for understanding microelectronics. Semiconductor physics, phase diagrams, crystal growth, epitaxy, vacuum techniques, thin-film deposition, diffusion, oxidation, junction formation, masking, and properties of thin films and materials. Prerequisite: ECE 221 or equivalent. (Fall, odd years)
- 329 Electromagnetic Engineering Research (arr.)** Staff
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)
- 335 High-Resolution Array Antennas (3)** Wasyliwskyj and Staff
Review of electromagnetic-wave propagation; radiation and reception by array antennas; antenna arrays as multiport receivers. Angle-of-arrival estimation using MUSIC and related techniques. Application to radar multipath problems and angle-of-arrival estimation. Prerequisite: ECE 203, 210. (Spring, even years)
- 346 Telecommunications Protocols (3)** Helgert and Staff
Layered protocol models for computer communications networks. Open systems interconnection reference model. CCITT and ISO protocol standards in support of OSI. Proprietary communications architectures. TCP/IP, SNA, and DNA. Protocols for local area networks and integrated services digital networks. Prerequisite: ECE 248. (Fall, even years)
- 347 Telecommunications Software Engineering (3)** Helgert and Staff
Formal description techniques for protocol specification. Graphical and matrix representations of finite-state protocol models. Specification and Description Language (SDL) and CCITT High-Level Language (CHLL). Software implementations of computer communications protocol architectures. Prerequisite: ECE 346. (Spring, odd years)
- 348 The Internet: Design and Implementation (3)** Helgert and Staff
Physical architecture: transmission systems, bridges, gateways, routers, servers, and hosts. Service structures: NBP, NAP, ISP. Protocol architecture. Transmission, routing, and application protocols. The World Wide Web: CGI, HTTP, search engines, and browsers. Security: access control, firewall, packet filters, integrity mechanisms. Software issues. Prerequisite: graduate standing. (Spring, even years)
- 349 Communications Research (arr.)** Staff
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)
- 364 Direct Energy Conversion (3)** Harrington and Staff
Electrostatic and magnetic conversion systems, conversion of heat to electricity, thermoelectric systems, conversion of light to electricity, fuel cells and batteries, magnetohydrodynamic systems, superconductive machines and systems. Prerequisite: ECE 264. (Spring, even years)
- 368 High-Voltage Test Techniques (3)** Harrington and Staff
Methods and procedures for measurement of high voltage: basic testing techniques for alternating voltages, direct voltages, lightning-impulse voltages.

- switching-impulse voltages, and impulse currents. Determination of the dielectric strength of electrical insulation materials at power frequencies. The use of sphere gaps for the measurement of peak values. (Spring, even years)
- 372 **Control of Large Systems** (3) Lee and Staff
Systems as multistage decision processes. Analytical concepts of model making and matrix representations of large systems. Approximation by models of lower dimension: reduction to simplified models, decentralized systems. Differential games, computation of saddle points, construction of an equilibrium point. Prerequisite: ECE 273. (Fall, even years)
- 382 **Biomedical Signals and Systems** (3) Guo and Staff
Techniques for quantitative analysis of biomedical signals and systems; application to practical problems. Physiologic system modeling and control; wavelets. Weekly computer-based assignments involve analysis of simulated and actual biomedical data. Prerequisite: ECE 284 or permission of instructor. (Fall, even years)
- 383 **Bioelectric Phenomena and Bioelectromagnetics** (3) Loew and Staff
Mathematical treatment of bioelectric phenomena: membrane, dynamics, potentials, and subthreshold effects; solid-state phenomena; nerve propagation. Electromagnetic interactions with biological systems; energy absorption and heat production; diagnostic and therapeutic applications of electromagnetic energy. Prerequisite: ECE 210, 283. (Fall, even years)
- 384 **Medical Imaging** (3) Loew and Staff
Principles of projection radiography, fluoroscopy, tomography, ultrasound, and nuclear sources (PET, SPECT); biomagnetic imaging. Characterization of source and object; recorder resolution and noise. Scatter and attenuation. Reconstruction algorithms and implementations for CT and MRI. Recent developments. Prerequisite: ECE 211 or equivalent, 284. (Fall, odd years)
- 385 **Special Topics in Medical Engineering** (3) Loew and Staff
Exploration of theoretical or technical advances in medical engineering. Topic to be announced in the *Schedule of Classes*. (Fall and spring)
- 389 **Medical Engineering Research** (arr.) Staff
Limited to students working on the Doctor of Science dissertation. May be repeated for credit. (Fall and spring)
- 390 **Colloquium** (0) Lang and Staff
Lectures by outstanding authorities in electrical and computer engineering. Topics to be announced each semester. (Fall and spring)
- 399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Science candidates. May be repeated for credit.

ENGINEERING MANAGEMENT AND SYSTEMS ENGINEERING

Professors N.D. Singpurwalla, J.E. Falk, R.M. Soland, R.C. Waters, E.L. Murphree, Jr., H. Eisner, G.R. Brier, J.R. Harrauld, S. Sarkani, G. Frieder, T.A. Mazzuchi (Chair), J.P. Deason

Associate Professors M.R. Duffey, M.A. Stankosky, H. Abeledo, J.A. Barbera

Assistant Professors J.R. van Dorp, T. Jefferson, J.C. Ryan, M.P. Hamner

Adjunct Professors R.R. Romano, A.J. Murray, G.M. Gerson

Professorial Lecturers W.A. Goetz, S.F. Pauls, H.S. Kimmel, R.W. Kopka, N. Gerstanzang, A. Procko, R.M. Andersen, S.M. Wander, F.R. Power, W.P. Henderson, F.H. Stoodley, F. Allario, C.R. Cothorn, R.S. Cutler, D.J. Ryan, L.W. Transeau, C.H. Voas, N.J. Kirkendall, D.A. Samuelson, J.E. Collins, M.G. Goode, D.R. Skeen

Associate Professorial Lecturers R.D. Hofler, B.A. Brower, P.A. Massimini, P.G. Meikle, B.L. Lewis, S.V. Massimini, A. Green, D.M. Chadwick

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees.

- 201 **Survey of Operations Research: Deterministic Models** (3) Abeledo and Staff
Basic concepts and techniques of deterministic operations research modeling as applied to problems in industrial and governmental decision making. Linear, integer, nonlinear, and dynamic programming; networks; game theory. Prerequisite: Math 32 or permission of instructor. (Fall)
- 202 **Survey of Operations Research: Stochastic Models** (3) Soland and Staff
Basic concepts and techniques of stochastic operations research modeling as applied to problems in industrial and governmental decision making. Markov chains.

- queuing, inventory, regression analysis, forecasting, reliability analysis, and simulation. Prerequisite: ApSc 115, Math 32, or permission of instructor. (Spring)
- 204 **Management of Engineering Contracts** (3) Murphree and Staff
Study of the total contracting process (including initial budget preparation and justification, execution of a contract, and administration of the contract to completion) considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services. (Fall)
- 207 **The Human Resources Function for Engineering Managers** (3) Waters and Staff
Principles, theory, and practical considerations of the human resources function for engineering managers, with applications for engineering management. Issues and case studies examined within the context of the totality of the process of management as well as the dynamics of human resources management. (As required)
- 208 **Stochastic Foundations of Operations Research** (3) Soland and Staff
Topics in probability theory, stochastic processes, and statistical inference. Foundations of probability, conditional probability and expectation, Poisson processes, Markov chains, and Bayesian inference. Prerequisite: ApSc 116 or permission of instructor. (Fall)
- 209 **Mathematics in Operations Research** (3) Abeledo and Staff
Mathematical foundations of optimization theory: linear algebra, advanced calculus, and real analysis. Geometrical interpretations. Numerical methods and use of software. Applications to modeling techniques in operations research. Prerequisite: Math 33. (Fall)
- 210 **Engineering Law** (3) Stankosky and Staff
Legal principles and procedures of interest to engineers. The American legal system, contracts and specifications, liability of professional engineers, product liability, agency relationships, patent and proprietary rights, special problems in research and development contracts. (As required)
- 211 **Organizational Behavior for the Engineering Manager** (3) Hamner and Staff
Behavior at the engineering organization level. Emphasis on changing engineering organizations and their cultures and on increasing their effectiveness. Includes evaluating and selecting engineering organization structures, considering influences on their design, and reviewing work design and encouraging innovation. (Fall)
- 212 **The Management of Technical Organizations** (3) Waters and Staff
The practice of management as applied within technical organizations. Includes history of the tradition and current effective practices, research findings, and case studies, with objectives of enhanced understanding of external and internal factors influencing organizational performance and leadership requirements. (Fall, spring, and summer)
- 216 **Research Methods for the Engineering Manager** (3) Mazzuchi and Staff
Advanced course in research, experimental, and statistical methods for engineering management doctoral and master's students who need to write a thesis or dissertation. Prerequisite: EMSE 269 or permission of instructor. (Fall)
- 217 **Fundamentals of Artificial Intelligence** (3) Stankosky and Staff
History of AI, expert systems, knowledge representation, search and control techniques, natural language processing, computer vision, computer speech, knowledge-based systems, and evidential reasoning. Hands-on experience with a knowledge-based shell. Laboratory required. (Spring)
- 218 **Management of Information and Systems Security** (3) Ryan and Staff
Development and management of effective security systems. Includes information, personnel, and physical security. Emphasis on risk analysis for information protection. (Spring, odd years)
- 219 **Object-Oriented Analysis and Design** (3) Jefferson and Staff
The object-relationship model and the object-behavior model. Managing complexity with views and high-level modeling in object-oriented systems analysis. The concepts, the method, and applications, including object-based and object-oriented languages. Prerequisite: EMSE 250. (Spring, even years)
- 220 **Policy Factors on Environmental and Energy Management** (3) Deason and Staff
Exploration of the policy development process from several different but integrated perspectives. Focus on areas of environmental and energy man-

- agement and use of current case studies to develop a framework of understanding to support decisions in a broad variety of management settings. (Fall, odd years)
- 221 **Environmental Management (3)** Deason and Staff
Technical, economic, political, administrative, and social forces influencing the quality of the environment and the use of resources. Government and industrial programs to combat pollution of the air, soil, and water; existing and pending pertinent legislation; theoretical aspects of specific management problems. (Fall)
- 222 **Energy Management (3)** Deason and Staff
Examination of the range of available energy resources, trends in their use, the programs and organizations that have developed and evolved to address problems associated with energy resource use. (Spring)
- 223 **Air Quality Management (3)** Deason and Staff
Explores the nature of critical local, regional, continental, and global problems associated with air pollution, covering historical evolution of such problems. Examines the complex regulatory and institutional framework controlling air quality management in the U.S. Explains current air quality management concepts and processes. (Spring, odd years)
- 224 **Analytical Tools in Environmental Management (3)** Deason and Staff
A survey course in environmental management, focusing on tools to assess the environment: cost benefit analysis, land use, comprehensive planning, Congressional activities, and environmental laws. The regulatory process as it relates to environmental management. Risk assessment methodology. Modeling approach to solving environmental problems. (Spring)
- 225 **Hazardous and Toxic Waste Management and Cleanup (3)** Deason and Staff
Hazardous waste management and cleanup processes used in the U.S. and around the world. The roles of the relevant federal, state, and local government agencies; major hazardous and toxic waste laws and regulations. Planning, assessment, investigation, design, and construction phases of toxic and hazardous waste remediation projects. (Summer)
- 226 **Water Quality Management (3)** Deason and Staff
Examines the nature of point and non-point sources of surface and ground water pollution and the statutory, regulatory, and institutional framework controlling water quality management activities in the U.S. Current approaches to water quality protection and enhancement. The role of engineered treatment processes in water quality management. (Fall, even years)
- 227 **Analytical Tools for Energy Management (3)** Deason and Staff
Analytical tools needed to manage energy resources at the facility level. Energy technologies: instrumentation, measurement, and control. Energy auditing; conservation techniques, financial and economic analysis, and maintenance of energy budgets. The functions of an energy management office of a large organization. (Fall)
- 231 **Program and Project Management (3)** Eisner and Staff
Basic instruction in the use of the Critical Path Method (CPM) for project and program planning; computers for project management; Primavera computer software; project organization for on-site management; cost accounting; multi-project (program) management; resource management for the project; extensive use of computers to solve project-related problems. (Fall)
- 232 **Crisis and Emergency Management (3)** Harrauld and Staff
Concepts and problems of crisis and emergency management. Defining crises, emergencies, and disasters. Developing crisis and contingency plans. The Federal Response Plan and National Contingency Plan, organizing for response, managing the response organization, managing in a turbulent environment, crisis decision making and communication. (Fall)
- 233 **Information Technology in Crisis and Emergency Management (3)** Harrauld and Staff
The role of information in crisis and response management; determining disaster and crisis information requirements; information technologies applied to crisis, disaster, and emergency management; causes and effects of information breakdowns during crises and disasters. (Spring)

- 234 Management of Risk and Vulnerability for Natural and Technological Hazards (3)** van Dorp and Staff
Development of concepts required for risk-based planning and risk management. Objectives and methods for vulnerability assessment for natural disaster, technological hazards, and terrorist threats. Risk analysis, risk perception, risk communication, risk mitigation. (Fall)
- 235 Systems Thinking and Policy Modeling I (3)** Mazzuchi and Staff
Stock-flow analysis of feedback systems presented for policy analysis and management. System dynamics; principles of systems employed to structure the problem-solving process. Problems and case studies solved using microcomputers. (Fall)
- 236 Systems Thinking and Policy Modeling II (3)** Mazzuchi and Staff
Case studies in dynamic policy analysis. Use of microcomputers in simulation. The class collectively models and simulates a social system to explore policy options. Prerequisite: EMSE 235. (Spring, odd years)
- 237 Logistics Planning (3)** Mazzuchi and Staff
Quantitative methods in model building for logistics systems, including organization, procurement, transportation, inventory, maintenance, and their interrelationships. Stresses applications. Prerequisite: ApSc 115, Math 33. (Spring, odd years)
- 238 Current Issues in Emergency and Crisis Management (3)** Harrauld and Staff
Seminar on current issues and the management successes and failures exhibited during recent disaster or crisis events. Includes presentations from federal, local, private, and nonprofit perspectives. (Spring, even years)
- 239 Health and Medical Issues in Emergency Management (3)** Barbera and Staff
Health and medical management issues involved in crises and emergencies presented for the non-medical emergency manager. Methods for integrating medical and public health processes into emergency management programs. (Spring, odd years)
- 240 Terrorism Preparedness (3)** Barbera and Staff
Terrorists, their motives, methods, and targets, and the implications for emergency management mitigation, preparedness, response, and recovery. Vulnerability of critical infrastructure and other civilian targets. Risk assessment and emergency management intervention. Local, national, and international resources and initiatives to prepare for mass terrorism incidents. (Fall)
- 241 Introduction to Management of Construction (3)** Murphree and Staff
How the construction industry worldwide works: feasibility studies; organization for construction; financing and cost accounting for construction; design and engineering contracts and procedures; construction contracts; change orders and delays; acceleration; claims, arbitration, mediation, litigation; labor management; project planning. (Fall, even years)
- 242 Construction Project Management (3)** Murphree and Staff
Applications of CPM concepts; owner and contractor viewpoints and needs; subcontractor relations and control; use of computer software (Primavera) to follow an example construction job from concept through design and contract award, and construction; attention to change orders, weather-caused changes to plans, and other delays; acceleration; claims; job closeout. (Spring, odd years)
- 243 Construction Cost Management (3)** Murphree and Staff
Cost estimating and control for owner and contractor from project concept through construction, operation and maintenance, to disposal. Parametric cost estimating; budget estimates during design; detailed quantity takeoff and pricing from completed designs; bid preparation; financing alternatives; cost control during construction; computers in cost control. (Spring)
- 245 Facilities Operation and Maintenance Management (3)** Murphree and Staff
Economic issues in facilities management; planning and organization for maintenance; energy and environmental issues; strategies; day-to-day operation and maintenance; estimating with standard production models; computers in maintenance operations; contracts for maintenance; preparation and administration; facility obsolescence, recycling and disposal. (Spring)
- 246 Reliability Analysis and Infrastructure Systems (3)** Sarkani and Staff
Fundamentals of reliability theory as applied to infrastructure systems. Modeling basic variables and defining the limit-state surface. Computing the reliabil-

- ity index of an infrastructure system by approximating the limit-state surface—FORM and SORM. Modeling an infrastructure system. Reliability analysis using branch and bound, failure paths and failure modes, identification of dominant failure paths. Case studies. (Fall)
- 250 **Information and Software Engineering (3)** Jefferson and Staff
Introduction to analysis and design of information systems including requirements analysis, project management, and software architectures. Introduction to CASE tools. Prerequisite: EMSE 256 or permission of instructor. (Fall)
- 251 **Linear Programming (3)** Abeledo and Staff
The simplex method and its variants, considered from theoretical and computational points of view. Duality and sensitivity analysis. Decomposition methods for large-scale problems. Network flow problems. Prerequisite: EMSE 209 or permission of instructor. (Fall)
- 252 **Nonlinear Programming I (3)** Falk and Staff
Basic theoretical and computational topics in optimization theory, including convexity and the optimality conditions. Algorithms for solving unconstrained, linearly constrained, and nonlinearly constrained problems. Applications. Prerequisite: EMSE 209 or permission of instructor. (Spring)
- 253 **Integer and Network Programming (3)** Abeledo and Staff
Combinatorial optimization problems: algorithms and applications. Network problems: minimum spanning tree, shortest path, maximum flows, minimum cost flows, optimal matchings, routing problems. Complexity theory. Enumeration and cutting plane methods for solving integer programs. Prerequisite: EMSE 251 or permission of instructor. (Spring, odd years)
- 254 **Applied Optimization Modeling (3)** Falk and Staff
Analysis of optimization models, including areas of nutrition, water pollution, energy, reliability, inventory control, game theory, chemical equilibrium, portfolio selection, and parameter estimation. Solution of models via the GAMS modeling software. Prerequisite: Math 33. (Fall)
- 255 **Management of Research and Development (3)** Waters and Staff
Study of technological innovation as a vital part of the organizational adaptation process. Role of the technical manager in using organization, planning, and motivation to accomplish research and development objectives. (Spring, even years)
- 256 **Information Management and Information Systems (3)** Jefferson and Staff
The use of information in organizations, the management of the information resource; the impact of information and communication technology. (Fall, spring, and summer)
- 257 **Production Design (3)** Duffey and Staff
Consideration of production design and operations in the context of an integrated company strategy. Process and trade-off analyses, capacity management and planning, technology planning. (As required)
- 260 **Survey of Finance and Engineering Economics (3)** Duffey and Staff
Survey of material relevant to financial decision making for engineering activity. Includes traditional engineering economy topics; fundamentals of accounting; and financial planning, budgeting, and estimating applicable to the management of technical organizations. (Fall, spring, and summer)
- 261 **Economic Analysis in Engineering Planning (3)** Duffey and Staff
Case studies in engineering economic analysis, capital budgeting, benefit-cost analysis, and other cost-related methodologies relevant to engineering managers. Prerequisite: EMSE 260 or permission of instructor. (Fall)
- 262 **Finance for Engineers (3)** Waters and Staff
Financial analysis and concepts useful to engineers: sources and uses of funds, management of working capital, leverage, valuation, forecasting, investment decisions. Prerequisite: EMSE 260. (Fall)
- 267 **Theory of Games (3)** Falk and Staff
Mathematical models of conflict and cooperation with applications in economics, business, defense, transportation, and societal issues (voting schemes, fair division, auctions). Concept and computation of equilibrium in n-person games. Prerequisite: Math 33. (Fall)
- 268 **Decision Analysis (3)** Soland and Staff
Decision making under certainty, uncertainty, and one and several criteria. Decision analysis and decision trees, value of information, subjective probability and Bayesian statistics, utility and value theories, multiple-criteria decision

- making and optimization, goal programming. Prerequisite: ApSc 116 and EMSE 201 or 251; or permission of instructor. (Fall, even years)
- 269 **Elements of Problem Solving and Decision Making for Managers** (3) Mazzuchi and Staff
Problem formulation. Concepts and techniques used in analyzing management problems. Modeling decision problems using decision trees, probability models, multi-objective models and utility theory. Class examples using computer application packages. (Fall, spring, and summer)
- 270 **Knowledge Management I** (3) Stankosky and Staff
The foundations of knowledge management, including cultural issues, technology applications, organizational concepts and processes, management aspects, and decision support systems. Case studies. (Fall)
- 271 **Data Analysis for Engineers and Scientists** (3) Singpurwalla and Staff
Design of experiments and data collection. Regression, correlation, and prediction. Time series models: autoregression, moving averages, and exponential smoothing. Neural nets. Data filtering and dynamic modeling. Data pooling, data compression, information fusion, and data mining. Model validation. Prerequisite: ApSc 115. (Fall)
- 273 **Discrete Systems Simulation** (3) Frieder and Staff
Simulation of discrete stochastic models. Simulation languages. Random-number/random-variate generation. Statistical design and analysis of experiments, terminating/nonterminating simulations; comparisons of system designs. Determination of input distributions. Variance reduction. Validation of models. Prerequisite: ApSc 116, CSci 51, or permission of instructor. (Spring)
- 277 **Queuing Theory** (3) Mazzuchi and Staff
Single-channel exponential queuing systems. Markovian single- and multiple-channel models, including birth-death processes, finite sources, Erlangian models. General arrival and service patterns. Jackson networks. Model building, basic solution techniques, and formal theoretical developments. Prerequisite: EMSE 208 or permission of instructor. (Spring, even years)
- 279 **Inventory Control** (3) Mazzuchi and Staff
Mathematical techniques applied to decisions about when and how much to produce or purchase. Mathematical models of inventory systems with deterministic and stochastic demands, continuous and periodic review policies, multi-item models with constraints, multi-echelon models. Prerequisite: ApSc 116 or permission of instructor. (Fall, odd years)
- 281 **Reliability Theory I** (3) Singpurwalla and Staff
Mathematical theory: coherent structures, association of random variables, stochastic characterization of wear, preservation theorems, bounds and inequalities. Statistical theory: probabilistic derivation of failure models; Bayesian methods. Life testing, survival analysis, expert opinion. Prerequisite: EMSE 208 or permission of instructor. (Fall)
- 282 **Quality Control and Acceptance Sampling** (3) Mazzuchi and Staff
Statistical approaches to quality assurance. Single and multivariate control charts, acceptance sampling by attributes and variables, process capability and design of experiments. Prerequisite: ApSc 115 or permission of instructor. (Spring)
- 283 **Systems Engineering I** (3) Eisner and Staff
Systems approach to the architecting and engineering of large-scale systems; elements of systems engineering; methods and standards; computer tools that support systems and software engineering; trends and directions; the integrative nature of systems engineering. (Fall, spring, and summer)
- 284 **Systems Engineering II** (3) Eisner and Staff
Specific applications of systems engineering tools and techniques; student projects. Prerequisite: EMSE 283 or equivalent. (Spring)
- 285 **Systems Analysis and Management I** (3) Eisner and Staff
The systems or holistic approach as a methodology for making decisions and allocating resources. Analysis by means of objectives, alternatives, models, criteria, and feedback. Prerequisite: EMSE 269 or equivalent. (Fall)
- 286 **Systems Analysis and Management II** (3) Eisner and Staff
Case studies in systems analysis, including applications to industrial, economic, and military situations. Prerequisite: EMSE 285 or permission of instructor. (Spring)

- 287 **Decision Support Systems and Models (3)** Stankosky and Staff
Theory of decision making—a cognitive view. Modeling decision maker heuristics and processes. Design, implementation, and evaluation of state-of-the-art DSS (hands-on). Assess impact of behavioral, situational, and organizational variables. (Fall)
- 288 **Technology Issue Analysis (3)** Eisner and Staff
Contextual background and intellectual basis for addressing technology issues in the public and private sectors. Technology impact assessment, forecasting, and innovation; principles and practices of technology transfer as elements of a systematic approach to making technology decisions. (Fall, odd years)
- 289 **Seminar: Evolution of Technology and Organizations (3)** Waters and Staff
Exploration of the evolution of, and connections between, technology and human knowledge, particularly with respect to economic development. Assessment of the role of management in the process of societal change. (Spring, even years)
- 290 **Human Factors Engineering (3)** Stankosky and Staff
Study of the human-machine interface applied to system design, job design, and technology management. Human sensory-motor, perceptual, and cognitive functions; task analysis and allocation; contextual aspects of human factors engineering. Modeling, design, and evaluation methodologies. Applications to user-centered industrial and information systems. (As required)
- 291 **Problems in Operations Research (3)** Soland and Staff
Field experience in operations research on a team basis. Each small group confronts an actual problem and formulates a solution using operations research models. Oral and written reports. Open only to master's candidates in the department during the last year of their program. (Spring)
- 292 **Special Topics (3)** Mazzuchi and Staff
Selected topics in engineering management and systems engineering, as arranged. May be repeated for credit. Prerequisite: permission of instructor. (Fall and spring)
- 293 **Technical Enterprises (3)** Murphree and Staff
Essential features of technology-based companies from the entrepreneur's point of view. Team management of an enterprise in a computer-simulated environment. Designed for those working in technical firms and for government personnel who depend on technical firms as suppliers. (Spring, odd years)
- 294 **Marketing of Technology I (3)** Stankosky and Staff
Analysis of industrial marketing process and functions, providing concepts and tools for engineering managers to market high technology products and services. (Fall, odd years)
- 295 **Database Design and Database Management Systems (3)** Jefferson and Staff
Concepts, strategies, and features of database design and management. Analysis, design, and implementation of database systems for micro and mainframe applications. Development of a microcomputer database system. (Fall)
- 296 **Software Project Development with CASE (3)** Jefferson and Staff
Evaluation and selection of CASE tools, use of CASE tools in software design/project. Graphical user interface and re-engineering tools. Open only to master's candidates in the department during the last semester of their program. Prerequisite: EMSE 250. (Spring)
- 297 **Problems in Engineering Management (3)** Waters and Staff
Project course providing the opportunity to apply concepts and tools previously studied to the solution of an actual problem in engineering management. Students work in small groups, on a problem proposed by students and approved by the instructor. Open only to master's candidates in the department, preferably during the last year of their program. (Spring)
- 298 **Research (arr.)** Staff
Basic or applied research in engineering management or systems engineering. Open to master's degree candidates in the department. May be repeated for credit. (Fall, spring, and summer)
- 299-300 **Thesis Research (3-3)** Staff
- 311 **Marketing of Technology II (3)** Stankosky and Staff
A systematic treatment of global marketing in the context of U.S. industrial competitiveness. Emphasis on understanding the global technical and marketing

- environment and formulating marketing strategies. Prerequisite: EMSE 294. (Spring, odd years)
- 320 **Managing E-Commerce Technologies (3)** Jefferson and Staff
Principles of good e-business management. Methods of conducting e-commerce—major opportunities, limitations, issues, and risks. Popular technologies for building e-businesses, security authentication, privacy, acceptable use policies, and legal limits. (Fall, odd years)
- 321 **Data Communications and Networks (3)** Murphree and Staff
Technical and managerial aspects of data communications, with emphasis on communication networks. Methodologies used in data communications, communication networks, and distributed data processing. (Fall, odd years)
- 322 **A Strategic Approach to Information Systems (3)** Jefferson and Staff
Policies and guidelines that govern the arrangement of IT tools and data. Issues related to the establishment of a logical, coherent plan for decisions about technology investments and the support of tight coordination through a focus on system compatibility, interconnection, and integration. Prerequisite: EMSE 256 and 295. (Spring, even years)
- 332 **Disaster Recovery and Organizational Continuity (3)** Harrauld and Staff
Disaster recovery planning and business continuity. Recovery of information and communication systems. The role of the private sector in mitigation and recovery. Public/private partnerships in community reconstruction and recovery. (Fall, even years)
- 334 **Environmental Hazard Management (3)** Harrauld and Staff
Geological, meteorological, radiological, chemical, and biological hazards facing the United States and international communities. Organizational responsibilities for hazard identification and management. Communication and perceptions of vulnerability and risk. Challenges to local governments and communities. (Spring, even years)
- 344 **Construction Management Seminar (3)** Sarkani and Staff
Timely issues, recent research findings; guest speakers from the construction industry; in a seminar setting, students present results from individual research projects; applications of high technology in construction management; special emphasis given to productivity in construction. (Spring, even years)
- 351 **Advanced Topics in Mathematical Programming (3)** Falk and Staff
Fractional and geometric programming, branch-and-bound methods, max-min problems, Lagrangian algorithms, nonconvex optimization techniques. Prerequisite: EMSE 252 or permission of instructor. (Spring, odd years)
- 352 **Nonlinear Programming II (3)** Falk and Staff
Optimality conditions, convex analysis, development of families of unconstrained and constrained algorithms. Discussion of key results in mathematical programming, such as duality, rate of convergence, nonconvex programming, and sensitivity analysis. Prerequisite: EMSE 252 or permission of instructor. (Fall, odd years)
- 353 **Advanced Topics in Combinatorial Optimization (3)** Abeledo and Staff
Polyhedral theory. Integral polytopes. Use of polyhedral structure in the solution of integer programming problems. Strong valid inequalities for classes of integer programs. Lagrangian relaxation and decomposition methods. Prerequisite: EMSE 253 or permission of instructor. (Spring, even years)
- 370 **Knowledge Management II (3)** Stankosky and Staff
Advanced topics and case studies in knowledge management. Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan. Prerequisite: EMSE 270 or permission of instructor. (Spring)
- 371 **Advanced Topics in Forecasting (3)** Singpurwalla and Staff
Dynamic linear models, Kalman filtering, non-Gaussian filtering, spectral analysis, simulation techniques and optimal control. Prerequisite: EMSE 271 or permission of instructor. (Spring, odd years)
- 373 **Design and Analysis of Simulation Experiments (3)** Frieder and Staff
Special topics from among perturbation and sensitivity analysis, initial transient problems and warm-up periods for nonterminating simulations, variance reduction techniques, response surface methods, developments in simulation software. Prerequisite: EMSE 273 or permission of instructor. (Fall, odd years)

- 377 Advanced Stochastic Models in Operations Research (3)** Singpurwalla and Staff
Applied probability models, including the Poisson process, continuous-time, denumerable-state Markov processes, renewal theory, semi-Markov regenerative processes. Applications to queues, inventories, and other operations research systems. Prerequisite: EMSE 277 or permission of instructor. (Fall, even years)
- 381 Reliability Theory II (3)** Singpurwalla and Staff
Mathematical theory: stochastic characterization of multivariate survival, shock models and wear processes, and reliability theory for multistate components. Statistical theory: recent developments in analysis of failure data. Prerequisite: EMSE 281. (Spring, even years)
- 386 Advanced Topics in Management (3)** Waters and Staff
Reading and discussion of classical and recent literature concerning the philosophy and application of management principles. Total quality management concepts and techniques are covered, as are applications of statistical process control. (Fall, odd years)
- 387 Technological Forecasting and Management (3)** Stankosky and Staff
Concepts and methods for understanding the dynamics of technological change. Issues in technology assessment, technology transfer, and strategic management of technology. (Spring, even years)
- 388 Quantitative Methods in Cost Engineering (3)** van Dorp and Staff
Fitting exponential growth curves using cost data for forecasting; multiperiod capital budgeting using the analytical hierarchy process and optimization; and project network risk analysis. Case studies highlight theoretical complexities in solving problems. (Spring, odd years)
- 390 Human-Computer Interaction (3)** Ryan and Staff
The human factors of interactive computing. Fundamentals of cognitive psychology, linguistics, computer science, and management science applied to the design and development of interactive computer systems: user modeling, requirements analysis, human-computer interface design, new systems implementation. (As needed)
- 391 Project for Professional Degree (3)** Soland and Staff
Limited to students in the Applied Scientist or Engineer degree program. (Spring)
- 397 Advanced Topics in Operations Research (3)** Mazzuchi and Staff
Advanced topics from the literature of operations research for analysis, presentation, and discussion. Reading assignments from professional journals selected by the instructor and the student. May be repeated for credit. Prerequisite: permission of instructor. (As arranged)
- 398 Advanced Reading and Research (arr.)** Staff
Limited to Doctor of Science candidates. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to Doctor of Science candidates. May be repeated for credit.

ENGLISH

Professors R.N. Ganz, Jr., J.H. Maddox, G. Paster, J.A.A. Plotz, C.W. Sten, D. McAleavey, O.A. Seavey, L.B. Salamon, A. Romines, J.A. Miller, J. Shore
Associate Professors G.R. Bozzini, R.L. Combs, G. Carter, K. Moreland, M.S. Soltan, D. Moshenberg, M. Alcorn, F. Moskowitz (*Chair*), T.G. Wallace, M.D. Clair, J.M. Green-Lewis, J.J. Cohen, P. Cook, P. Chu, G. Wald, V. Chandra, P. Griffith
Assistant Professors E. Schreiber, J. Harris, A. Hewett, R. McRuer, C. Betensky, G. Gamber, P.M. Ryder, A. Schultheis, M. Mullen, L.M. Belau, C.A. Leenerts, A.B. Levine, K. Daiya, J.C. James, M.D. Jones, S. Lovelady, C. Hayes (*Visiting*), S.P. Willens
Adjunct Associate Professor J. Bolz
Adjunct Assistant Professors D. Scarboro, S. Maley, A. Wilkerson, S. Haedicke
Adjunct Instructors D.A. Bruno, S. Gold, P. Presser
Jenny McKean Moore *Writer in Washington* J. McNally

Master of Arts in the field of English with optional concentrations in English or American literature—Prerequisite: a Bachelor of Arts degree with an undergraduate major in

English or American literature, or 24 credit hours in English or American literature above the sophomore level.

Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) 24 credit hours of course work planned in consultation with the department advisor; (2) Level One proficiency (translation of a passage with a dictionary) in an approved foreign language (French, German, Italian, Spanish, Greek, or Latin); (3) a Master's Comprehensive Examination in American or English literature, to be passed at the end of the course work; and (4) a master's thesis (6 credit hours) on an approved topic, directed by a member of the department's graduate faculty. Students must maintain a grade-point average of at least 3.25.

Doctor of Philosophy in the field of English with optional concentrations in English or American literature—Prerequisite: a Bachelor of Arts degree with an undergraduate major in English or American literature, or 24 credit hours in English or American literature above the sophomore level.

Required: the general requirements stated under Columbian College of Arts and Sciences, including satisfactory completion of (1) 60 credit hours of course work (36 for students with M.A. degrees in English) planned in consultation with the department advisor; (2) Level Two proficiency (translation of a passage without a dictionary) in an approved foreign language, or Level One proficiency (translation with a dictionary) in two approved foreign languages (French, German, Italian, Spanish, Greek, or Latin); (3) a qualifying examination in American literature or English literature, to be passed midway through the student's course work, and a field examination, to be passed by the end of the student's course work, topics and reading lists for which are to be designed in consultation with two graduate faculty advisors; (4) a dissertation proposal, which must be approved no later than one semester after completion of course work; and (5) a dissertation (12 credit hours) on an approved topic, directed by a member of the department's graduate faculty and completed by the end of the fifth year of study.

Each student plans a program of studies in consultation with the department advisor and a committee of the graduate faculty. Students must maintain a grade-point average of at least 3.5.

Note: All graduate English courses from Engl 205 forward may be repeated for credit with permission of the director of graduate studies.

- 201 **Introduction to Graduate Studies in English** (3) Romines, Wallace
Introduction to methodology for researching, writing, presenting, and publishing literary scholarship, to faculty and area resources, to current professional issues. Instruction in electronic research. (Fall)
- 202 **Teaching Writing** (3) Alcorn, Moshenberg
Major texts and issues in contemporary composition theory and practical issues relating to writing classroom practice. Required of graduate teaching assistants and all other students who wish to teach in the writing program. (Fall)
- 203 **Introduction to Literary Theory** (3) Cohen, Soltan, Wald
An overview of methodologies for examining texts as linguistic and cultural productions. Methodologies explored may include structuralism, formalism, deconstruction, cultural materialism, postcolonial theory, feminism, gender studies, and queer theory.
- 205 **Advanced Literary Theory** (3) Cohen, Paster, Soltan, Wallace
The course focuses on a major figure or topic in theory (e.g., Foucault, Lacan, Barthes, Kristeva, Bakhtin, post-Marxist theory, language and power, the canon).
- 231-34 **Nineteenth Century** (3-3-3-3) Green-Lewis, Moreland, Plotz, Romines, Seavey, Sten, Wallace
Topics in British and American nineteenth-century writing and culture, exploring national traditions and international movements and issues, such as Romanticism, Realism, and others.
- 235-38 **Twentieth Century** (3-3-3-3) Chu, Green-Lewis, McAleavey, Miller, Moreland, Moshenberg, Romines, Soltan, Sten, Wald, James, Jones
Topics in twentieth-century British and American writing and culture, exploring national traditions and international movements and issues, such as literary modernism, anti-modernist and post-modernist currents, others.
- 240 **Writing Race and Nation** (3) Chu, Miller, Sten, Wald, Cohen, James, Jones
The course uses literary culture to explore intersections of origins and evolution of racial and ethnic identities and national myths and political objectives.

- 241 **Conceptualizing Genders (3)** Cohen, Paster, Wald, Wallace, Wolf
Structures of sex and gender difference considered historically and theoretically, including masculinity/femininity, sexualities, and their textual representations.
- 242-43 **Studies in Genre (3-3)** McAleavey, Paster, Daiya
Questions of genre, considered theoretically and practically. Content varies.
- 244 **Ethnicity and the Construction of Identity (3)** Chu, Sten
Literary culture is used to explore how individuals, communities, and societies construct self-awareness and knowledge about others for cultural exchange.
- 247 **Postcolonialism (3)** Plotz, Daiya
Postcolonial theory and texts by representative writers.
- 251 **Women and Writing (3)** Romines, Wald, Wallace
Selected topics in the traditions, theory, and texts of women's literary production and culture. Same as WStu 251.
- 261 **Selected Topics in Criticism (3)** Wald
Topics may include cultural studies, film, gay/lesbian studies, others.
- 295 **Independent Research (3)** Staff
Written permission of instructor required. May be repeated for credit to a maximum of 9 hours.
- 299-300 **Thesis Research (3-3)** Staff
- 301-2 **Folger Institute Seminars (3-3)** Staff
Topics will be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs. Consult the graduate advisor before registration.
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

ENVIRONMENTAL AND RESOURCE POLICY

Committee on Environmental and Resource Policy

H. Merchant (*Director*), D. Fuller, B.M. Mergen, W.C. Parke, G. Stephens, A.M. Yezer

Columbian College of Arts and Sciences offers an interdisciplinary program leading to the degree of Master of Arts in the field of public policy with a concentration in environmental and resource policy. The program is affiliated with the Department of Earth and Environmental Sciences and is directed by the Committee on Environmental and Resource Policy. The program draws upon faculty and relevant courses from various departments within the University.

The Environmental and Resource Policy Program presents in its core requirement a graduate-level examination of the specific areas that affect decisions made in the broad area of environmental and resource policy. This material includes the analytic tools required for decisions leading to effective policy regarding the environment and natural resources. In addition to mastering the core material, a student is also expected to develop specific competence in an area of particular interest by choosing an approved elective field. Prospective candidates should consult with the director of the Environmental and Resource Policy Program.

Master of Arts in the field of public policy with a concentration in environmental and resource policy—Prerequisite: a bachelor's degree with a B average (or equivalent) in a social science, natural science, or other relevant area from an accredited college or university and an introductory course in statistics.

Required:

- The general requirements stated under Columbian College of Arts and Sciences.
- Twenty-eight hours of core courses selected from the following (students whose backgrounds include some of these courses may substitute additional courses in the elective field): BiSc 208, 243; Econ 217, 237; E&RP 210, 240; PSc 203; PAd 201; Stat 183 (or other appropriate statistical techniques course).
- Twelve credit hours chosen from designated courses within one of four elective fields—earth sciences, ecology, energy, and resource management. Courses are drawn from the Departments of Earth and Environmental Sciences, Biological Sciences, Economics, and Geography and from the School of Engineering and Applied Science.

(d) **Comprehensive Project**—Undertaken at the completion of the student's program, the comprehensive project is the investigation of a specific problem in environmental and resource policy and the development of a proposed solution in a manner that integrates the core curriculum with the course work in the elective field.

210 Seminar in Environmental and Resource Policy (3) Merchant

Approaches to environmental decision making as related to the formation of environmental and resource policy. Emphasis on the development of a practical model to be used in the evaluation and incorporation of disparate information relevant to an environmental issue. Limited to degree candidates in the program or enrollment with permission of the instructor.

240 Environmental Impact Statement McGuirl

Procedures and Environmental Law (3)

The rationale for environmental impact statements from the viewpoint of the nature and origins of environmental concerns. Government agencies responsible for environmental impact statements; current statutes and regulations pertaining to the environment.

EPIDEMIOLOGY

Columbian College of Arts and Sciences offers the degrees of Master of Science and Doctor of Philosophy in the field of epidemiology. The School of Public Health and Health Services collaborates with the Department of Statistics and the Biostatistics Center in these degree programs. For the Public Health courses listed below, please contact the School of Public Health and Health Services.

Master of Science in the field of epidemiology—Prerequisite: course work in multivariate calculus and matrix theory (Math 33 and 124) and proficiency in computer applications (Stat 183 or PubH 251). With approval of the academic director, applicants who lack some of the listed prerequisite course work may be admitted to degree candidacy and fulfill deficiencies during the first year of study; such course work does not count toward degree requirements.

Required: The general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 33 hours of course work, including Stat 157–58 and PubH 191, 201, 202, 240, 255, 280, 290, and 291. Two elective courses are chosen from either statistics or public health. A two-part Master's Comprehensive Examination is required.

Doctor of Philosophy in the field of epidemiology—Prerequisite: a master's degree in epidemiology or a closely related field, including the prerequisites listed under the Master of Science in the field of epidemiology. In some cases, an exceptionally well-prepared candidate may enter the program with a bachelor's degree.

Required: The general requirements stated under Columbian College of Arts and Sciences, including the required public health courses for the Master of Science in the field of epidemiology plus Stat 201–2, 210, 224, 225, and one course chosen from PubH 205, 211, or 213. Electives are chosen from statistics and public health. At the end of the second year of study, a two-part General Examination is taken on biostatistics and epidemiology. A minimum of 12 hours of dissertation research is required; the dissertation must demonstrate the candidate's ability to do original research that develops methods or applications in the field of epidemiology.

295 Reading and Research (arr.) Staff

May be repeated for credit.

299–300 Thesis Research (3–3) Staff

398 Advanced Reading and Research (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit.

EUROPEAN AND EURASIAN STUDIES

Program Committee: J. Goldgeier (*Director*), H. Agnew, M. Atkin, H.B. Feigenbaum, M. Goglewski, H. Harrison, P. Reddaway, S.S. Rehman, R. Robin, P. Rollberg, M.J. Sodaro, R. Thornton, S. Wolchik, A. Zimmerman

Master of Arts in the field of European and Eurasian studies—The Elliott School of International Affairs offers a multidisciplinary program that provides a broad background in the history and politics of Europe and Eurasia as well as analytical tools for understanding the domestic and international dynamics of the entire region. The program is designed to provide skill-based professional training for those interested in government, business, and related careers in European and Eurasian affairs, with strong academic preparation for those planning further study.

Prerequisite: The admission requirements stated under the Elliott School of International Affairs and a bachelor's degree in a related field.

Required: the general requirements stated under the Elliott School of International Affairs. The program consists of a minimum of 40 hours of course work. All students take a first field in European and Eurasian affairs consisting of five 3-credit courses, including at least one course each in political science, history, and economics. Students take a second field either in a professional track or an academic track. All students take IAff 295. In the final semester of the program, all students take a capstone course.

During the final 18 hours of the program, students must pass a language examination demonstrating oral and reading proficiency in a major European or Eurasian language. Those who pass exams in one language and wish to study a second European or Eurasian language may do so. Up to 6 hours of language study may be counted toward the 40 hours for the degree. Consult the program guidelines for further details.

FINANCE

Professors T.M. Barnhill (*Chair*), W. Handorf, M.S. Klock, S. Phillips, J.L. Glascock

Associate Professors J.M. Sachlis, N.G. Cohen, P.S. Peyser, G.M. Jabbour, I.G. Bajoux-Besnainou, M. Eppli, A.J. Wilson, P.R. Locke

Assistant Professors R. Savickas, K.L. Neuhauser

Professorial Lecturer S. Uyanik

Associate Professorial Lecturer R. Strand

See the School of Business and Public Management for programs of study in business administration leading to the degrees of Master of Accountancy, Master of Business Administration, Master of Science in Finance, and Doctor of Philosophy.

- 221 Financial Decision Making (3)** Sachlis, Peyser, Klock, Wilson
Theory and practice of business finance, emphasizing the impacts of long- and short-term uses and sources of funds on the firm's market value. **Prerequisite:** MBAd 250. (Fall and spring)
- 222 Capital Formation (3)** Handorf
Determinants of saving and investment and resultant funds flow are evaluated. Special emphasis on the level and risk structure and term structure of interest rates. The role and management of financial institutions is stressed. **Prerequisite:** MBAd 250. (Fall and spring)
- 223 Investment Analysis and Portfolio Management (3)** Amling, Cohen, Klock, Bajoux-Besnainou
Risk-reward analysis of security investments, including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. **Prerequisite:** MBAd 250. (Fall and spring)
- 224 Financial Management (3)** Barnhill, Cohen
Advanced case studies in domestic and international financial management; working capital policy, capital budgeting, financing with debt and equity, dividend policy, valuation, project finance, venture capital, and mergers and acquisitions. **Prerequisite:** Fina 221. (Fall and spring)
- 231 Seminar: Investment and Portfolio Management (3)** Staff
Portfolio management theory, application, and computer modeling. Independent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. **Prerequisite:** Fina 223. (Fall)
- 233 Bank Management and Regulation (3)** Staff
Consideration of a range of issues faced by bank managers. Financial models are developed to provide an analytical framework to assist decision making in the context of relevant regulatory restraints. **Prerequisite:** MBAd 250 and Fina 222 or permission of instructor.

- 235 Futures Markets: Trading and Hedging (3)** Seale, Locke
Organization and regulation of futures markets. Alternative strategies for trading of futures contracts for possible hedging uses. High risk-high return investment alternatives. The use of futures markets to manage risks. Prerequisite: Introductory courses in economics, statistics, computer usage, and financial management. Prerequisite: MBAd 250; recommended: Fina 221. (Fall and spring)
- 236 Options (3)** Jabbour, Locke
Pricing of options on financial instruments. Role of options in risk management, trading strategies, hedging implications for national and international investors, financial engineering, and structure and regulation of option markets. Prerequisite: MBAd 250; recommended: Fina 221. (Fall and spring)
- 237 Personal Financial Advising (3)** Cohen
For students preparing to be personal financial advisors; the combination of taxes, pensions, investing, budgets, estates and trusts, and insurance into comprehensive personal financial plans. Regulation, professional ethics, and the economics of advisory firms. Extensive use of computer spreadsheets and case studies. Prerequisite: Fina 223; Accy 261 is recommended. (Spring)
- 238 Financial Engineering (3)** Barnhill
Valuation and risk management theory for bonds, forward contracts, swaps, options, exotic options, and interest rate options. Development of financial software, including Monte Carlo simulation modeling. Case studies of innovative solutions to investment, corporate finance, and financial institution management problems. Prerequisite: Fina 236. (Spring)
- 239 Financial Theory (3)** Peyser, Klock
In-depth theoretical analysis of financial topics, including asset management, financial structure, dividend policy, and the capital asset pricing framework. Prerequisite: Fina 221, 223. (Fall)
- 240 Real Estate Development (3)** Staff
Examination of the forces that shape real estate development; market analysis methods and techniques to evaluate project feasibility; the institutional and legal framework within which real estate development occurs and that influences controls, land value, and development potential. (Fall)
- 241 Financing Real Estate Development (3)** Eppli
Principles of real estate development finance; evaluating and measuring the investment attractiveness of real estate projects; obtaining, differentiating, and hedging sources of real estate funding; and appraising property. Incentives provided by local, state, and federal governments. Prerequisite: MBAd 250 or permission of instructor. (Fall and spring)
- 242 Problems in Real Estate Valuation (3)** Glascock
Applications of market analysis, valuation, and financial techniques to the real estate development process.
- 248 Real Estate Development Cases (3)** Staff
Case study analysis of large-scale commercial real estate developments to gain comprehension of financial, political, legal, and technical complexities and constraints inherent in the real estate development process. Prerequisite: Fina 220 or permission of instructor.

Master of Science in Finance degree candidacy is prerequisite to Fina 271 to 282.

- 271 Financial Modeling and Econometrics (4)** Soyer, Wirtz
Applied statistical and econometric analysis and modeling in finance. Methodologies include descriptive and inferential statistics, multivariate regression, time series analysis, and simulation modeling. Empirical studies are reviewed, and a series of research projects are undertaken. (Fall)
- 272 Global Financial Markets (4)** Askari, Rehman
Theories explaining domestic and international interest rate and exchange rate structures. Roles of financial institutions and markets are investigated and forecasting methodologies are applied. (Spring)
- 273 Advanced Accounting Applications for Finance (4)** Kumar, Smith
Intermediate financial accounting; international and tax accounting. Emphasis on computer modeling to analyze and forecast a firm's financial statements to reflect possible future performance. (Fall)

- 274 Corporate Financial Management and Modeling (4)** Sachlis, Handorf
The foundation theories of business real investment and financing are summarized and applied in a simulation environment. Emphasis on understanding the causal connections between business decision making in a global economy and the resulting valuation of the firm's financial assets. Financial modeling and forecasting applications. (Fall)
- 275 Investment Analysis and Global Portfolio Management (4)** Glascock, Peyser
Financial markets and instruments viewed from the investor's perspective. Analysis of the value of equity and fixed-income securities and the construction of efficient portfolios in a global financial market. Issues of market efficiency, tax structures, and investment funds; computer-based models. (Spring)
- 276 Financial Engineering and Derivative Securities (4)** Jabbour, Locke
Mathematical and theoretical foundations to value-derivative securities, including options, futures, and swaps; hedging and trading applications of these contracts. Arbitrage trading across cash and derivative markets and its role in maintaining equilibrium prices. (Summer)
- 277 Comparative Financial Market Regulation and Development (4)** Park
Theory and current status of comparative regulation of domestic and international financial institutions and markets. Effects on country economic development and international trade. (Fall)
- 278 Financial Theory and Research (4)** Peyser, Bajeux-Besnainou
Theoretical constructs of business investment and financing decisions and of financial asset pricing structures in domestic and international environments. Analytical and numerical models are developed, and empirical studies are evaluated. (Spring)
- 279 Real Estate Finance and Fixed-Income Security Valuation (4)** Eppli, Jabbour
A primary focus is the application of financial theory to real estate investment and financing. Another is fixed-income security valuation and design and portfolio management. Application of decision support and artificial intelligence systems in making financial decisions. (Spring)
- 280 Financial Institution Management and Modeling (4)** Handorf, Barnhill
Financial institution asset and liability management. A dynamic simulation model is developed and run under varying macroeconomic conditions, as additional layers of complexity, involving multinational investment, borrowing, and hedging, are added. (Summer)
- 281 Cases in Financial Management and Investment Banking (4)** Cohen, Jabbour
Through a series of cases and simulations, students address real financial problems faced by domestic and international companies, including capital budgeting, capital structure, mergers and acquisitions, and project financing. The negotiating process by which many financial situations are resolved is emphasized. (Summer)
- 282 Directed Research in Finance (1 to 4)** Klock
Students design and execute a financial research study, applying knowledge developed throughout the M.S. in Finance program. Class sessions vary from lectures on research methods to colloquia by outside professionals to critique studies. (Summer)
- 290 Special Topics (3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 298 Directed Readings and Research (2 to 4)** Staff
- 299 Thesis Seminar (3)** Staff
- 300 Thesis Research (3)** Staff
- 311 Seminar: Public-Private Sector Institutions and Relationships (3)** Staff
Same as SMPP 311.
- 321 Seminar: Financial Markets Research (3)** Peyser, Klock, Sachlis
Market efficiency, utility testing, the capital asset pricing model, the arbitrage pricing theory, the option pricing model, and aggregate market volatility. Prerequisite: Fina 239.
- 323 Seminar: Corporate Finance Research (3)** Peyser, Klock, Sachlis
Capital budgeting, capital structure issues, dividend policy, microeconomic foundations, mergers, and agency theory. Prerequisite: Fina 239; Mgt 202 or MBAd 220.

- 323 Seminar: Continuous-Time Finance (3)** Bajeux-Besnainou
Review of the stochastic calculus methods needed for continuous-time pricing models. The most important continuous-time models, including pricing of derivative securities, consumption-portfolio selection models, continuous-time capital asset pricing models, consumption-based capital asset pricing models, continuous-time arbitrage pricing theory, and different yield curve models. (Spring)
- 324 Seminar: Financial Markets and Institutions (3)** Staff
Multi-period asset pricing, term structure of interest rates, market imperfections and institutional factors, auctions, manipulation, derivative markets, market microstructure, and financial institutions.
- 397 Doctoral Seminar (1 to 3)** Staff
- 398 Advanced Reading and Research (arr.)** Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to doctoral candidates. May be repeated for credit.

FINE ARTS AND ART HISTORY

Professors L.F. Robinson, J.F. Wright, Jr., J.L. Lake, T. Ozdogan, M.P. Lader, C.C. Costigan, J.C. Anderson, W.T. Woodward, B. von Barghahn, H.I. Gates, S.B. Molina, D. Bjelajac (*Chair*), N. Blossom

Associate Professors J.L. Stephanic, K.J. Hartswick, P. Jacks

Assistant Professors T. Brown, C. Spangler, E. Speck, M.K. Tan

Adjunct Associate Professor C.R. Rose

Associate Professorial Lecturers A.B. Barnhart, L.D. Miller, J. Paradiso

Master of Arts in the field of art history—Prerequisite: a Bachelor of Arts degree with a major in art history from this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences: 33 credit hours, including 6 hours of thesis research. As many as possible of the 27 credit hours of course work should be in 200-level courses; the 6 hours of electives may be taken in museum-related courses. Students are required to take a seminar in each of the following areas: art historiography, classical, medieval, Renaissance, Baroque, modern, and American. The art historiography seminar (taught under AH 261) must be taken during the first semester of course work. A reading knowledge examination in German or French must be passed before completion of the first 9 credit hours of course work. A Master's Comprehensive Examination must be passed before students can enroll for the 6 credit hours of thesis research. A written thesis must be submitted to and approved by the faculty.

Master of Arts in the field of art history with a concentration in museum training—Required: the general requirements stated under Columbian College of Arts and Sciences: 33 credit hours, including 6 hours of internship credit. As many as possible of the 27 hours of course work should be in 200-level courses. Students are required to take a seminar in each of the following areas: art historiography, classical, medieval, Renaissance, Baroque, modern, and American. Six hours of electives in art history or in museum-related courses are selected in consultation with the graduate advisor. A reading knowledge examination in German or French must be passed before completion of the first 9 credit hours of course work. Students are required to pass the Master's Comprehensive Examination in art history.

Satisfactory completion of 12 credit hours of graduate art history courses is required before internships may begin.

Internships may be applied for at any number of museums and galleries including the Corcoran Gallery of Art, Hirshhorn Museum and Sculpture Garden, Museum of African Art, National Museum of American Art, National Museum of Women in the Arts, Phillips Collection, Renwick Gallery, and Textile Museum.

Programs specific to museum studies and museum education are also available.

Master of Fine Arts in the field of ceramics, design, interior design, printmaking, painting, photography, sculpture, or visual communication—Prerequisite: a Bachelor of Fine Arts or a Bachelor of Arts degree with a major in fine arts in the field of ceramics, design,

drawing, interior design, painting, photography, printmaking, sculpture, or visual communication. Except for the field of interior design, departmental approval of the applicant's work is required. This should consist of slide examples of work in the area of application as well as slides of representative works in other areas. Applicants to the photography program should submit photographic works only. Applicants to the printmaking program should submit slides of work in the four primary areas of the discipline as well as 15 examples of drawings, 10 of which should be figure from life. Students planning to do graduate work in printmaking or painting must have completed 12 credit hours of drawing at the undergraduate level before admittance to the master's program.

Required: the general requirements stated under Columbian College of Arts and Sciences. A minimum of 45 credit hours of course work in fine arts is required; the number of required hours and their distribution are determined in consultation with an advisor. As much as possible of the course work should be in 200-level courses. For interior design, 39 credit hours are in required courses (including the two courses taken concurrently at the end of the program) and a minimum of 6 hours are in elective courses.

Except for interior design, a creative thesis consisting of the execution of original works of art in ceramics, design, painting, photography, printmaking, sculpture, or visual communication will be completed under the supervision of a thesis advisor. In addition, the thesis must include a written statement and analysis of artistic purpose, subject to the approval of the thesis advisor and a second faculty reader. A representative portion of the work illustrating the creative thesis may be retained by the University at the discretion of the thesis director in agreement with the second reader.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

ART HISTORY

- 203 **Topics in Iberian and Colonial Art of South America (3)** von Barghahn
Topics announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 220 **Seminar: Baroque Art of the 17th Century (3)** von Barghahn
A reading knowledge of Italian is desirable for the Italian area and German for the northern area. Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 221 **Seminar: Renaissance Art (3)** von Barghahn, Jacks
A reading knowledge of French, German, or Italian is desirable, depending on the specific area. Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 232 **Introduction to Conservation (3)** Rose
Same as Anth 232.
- 233 **Preventive Conservation Techniques (3)** Rose
Same as Anth 233.
- 234 **Problems in Conservation (3)** Rose
Same as Anth 234.
- 235 **Advanced Conservation Techniques (3)** von Endt
Same as Anth 235.
- 243 **Seminar: American Art (3)** Bjelajac
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 244 **Seminar: 19th-Century European Art (3)** Robinson
Reading knowledge of French desirable. Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 245 **Seminar: 20th-Century European Art (3)** Lader
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 246 **Seminar: Classical Art (3)** Hartswick
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 247 **Proseminar: Medieval Art and Archaeology (3)** Anderson
Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.

- 248 **Independent Research in Art History** (3)
 261 **Seminar: Problems in Art History** (3) Staff
 Topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
 284 **Seminar: Studies in American Art and History** (3) Staff
 Joint offering of the Art Department and the American Studies Program in affiliation with the National Portrait Gallery of the Smithsonian Institution. Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)
 285 **Museum Internship** (3 to 12) Staff
 Open only to candidates for the degree of Master of Arts in the field of art history with a concentration in museum training.
 289-90 **Thesis Research** (3-3) Staff

FINE ARTS

Note: All fine arts courses may be repeated for credit with approval of the department. Schedule of fees for Art 248 and 299-300: Ceramics—\$105; 2-D Design—\$24; 3-D Design—\$27; Drawing—\$75; Printmaking—\$54; Sculpture—\$35; Typography—\$75; Oil and Acrylic Painting—none; Watercolor—\$45; Photography—\$100; Visual Communication—\$100; Interior Design—\$100 (FA 248 only); Lithography—\$54; Serigraphy—\$75; Jewelry Design—\$36.

- 201 **Foundations in Interior Design Theory** (3) Staff
 Theory and topics in design. Application of design principles and elements to specific studies of the built environment. Examination of relationships among creative, social, and technical dimensions of interior design.
 202 **Graphics for Interior Design** (3) Staff
 Basic graphic communication skills appropriate for the development of design projects and study exercises. Two- and three-dimensional drawing skills developed through sketching, orthographic drawing, paraline drawing, and pictorial perspective. Use of equipment and material required for technical drawing. Laboratory fee, \$100.
 203 **Computer-Aided Drafting for Interiors** (3) Staff
 Introduction to CAD technology, two- and three-dimensional drawings, plotting and enhancement of presentations. Use of CAD to speed and enhance the design process. Prerequisite: FA 193. Laboratory fee, \$100.
 204 **Textiles and Finish Materials** (3) Staff
 Textile fiber content, physical characteristics, construction techniques, dyes, printing, and finishing. Standards, testing, specification, and application of textile products. Properties, specification, and installation of interior finish materials. A comprehensive textile notebook, fabric and finish presentation boards, a research paper, and class presentation are required. Laboratory fee, \$100.
 205 **Advanced Photography: Zone System Tests** (3 or 4) Lake
 Tone control through exposure development tests. Completion of laboratory manual required. Prerequisite: FA 181 and 182 or permission of instructor. Laboratory fee, \$100. (Fall and spring)
 206 **Advanced Photography: Color Printing and Zone Proofs** (3 or 4) Lake
 Printing from color negatives. Correct color balancing and creative color shifts will be explored. Development of portfolio of prints utilizing approved theme and the exposure and development times established in Art 205. Prerequisite: FA 181 or 205, as determined by instructor. Laboratory fee, \$100. (Fall and spring)
 208 **Advanced Photography: Special Projects** (4) Lake
 Independent projects requiring approval prior to registration. Prerequisite: FA 181 and 182, or permission of instructor. Laboratory fee, \$100. (Fall and spring)
 209 **Exhibition and Display Design** (3) Miller
 220 **Lighting Design** (3) Staff
 Terminology, concepts, and principles of lighting design. Light and energy, incandescent and gaseous discharge lamps, luminaires, task requirements, measurement and calculations, human factors, and design applications for lighting. Development of case studies highlighting successful lighting design installations. Prerequisite: FA 202. Laboratory fee, \$100.

- 221 **Graduate Interior Design Studio I (3)** Staff
Application of basic design concepts and processes to residential design. Human factors and development of space planning skills in single and multifamily spaces. Selection of furniture, fabric, and finishes. Design and custom millwork and window treatments. Introduction to research and documentation. Prerequisite: FA 202 and 204. Laboratory fee, \$100.
- 224 **Advanced Ceramic Sculpture (3)** Ozdogan
Continuation of Art 152 with emphasis on individual approach. Exploration of mixed media and mold casting. Laboratory fee, \$105. (Fall)
- 225 **Industrial Ceramics/Model and Mold Making/Functional Forms (3)** Ozdogan
Production processes from model making to finished duplicate form as it exists on factory level. All aspects of model designing and making in clay and plaster; plaster lathe carving with wheel applications; mold making in plaster; production methods from molds (press molding, slip casting, jiggering and jollying, and ram pressing). Laboratory fee, \$105. (Fall and spring)
- 226 **Architectural Ceramics (3)** Ozdogan
Advanced studies in ceramic murals and sculptures designed for indoor and outdoor architectural concepts. Laboratory tests and activities. Laboratory fee, \$105. (Spring)
- 231-32 **Design III (3-3)** Gates
New media and techniques in three-dimensional design. Laboratory fee, \$27 per semester. (Academic year)
- 235 **Design V: Textile Printing (3)** Staff
Designing and executing textiles using the techniques of silk screen, block print, and batik. Laboratory fee, \$24. (Fall and spring)
- 243 **Graduate Interior Design Studio II (3)** Staff
Nonresidential spaces: commercial, industrial, hospitality, and institutional. Intensive analysis and space planning of nonresidential interiors with emphasis on technology, codes, and environment and behavior concepts. Prerequisite: FA 221. Laboratory fee, \$100.
- 244 **Advanced Drafting and Materials (3)** Staff
Structural building systems, methods and materials of construction, and standard graphic representation. Organization and preparation of construction documents, finish and material and interior component schedules, and detailing. Prerequisite: FA 221. Laboratory fee, \$100.
- 245 **Advanced Interior Design Studio (3)** Staff
Multifaceted and complex problems in residential and nonresidential design. Further exploration of design theory, practical application and guidelines, and development of advanced studio work. Prerequisite: FA 243. Laboratory fee, \$100.
- 246 **Furniture Design (3)** Staff
Major 20th-century furniture designers and the environments in which the furniture was used. Study and design of furniture that combines functional and aesthetic quality. Use of two- and three-dimensional drawings and models to develop design and technical skills. Laboratory fee, \$100.
- 247 **Design of Printed Textiles (3)** Staff
Surface pattern design of textiles. Source materials, design techniques, and industry practices. Development of technical skills required for preparation of portfolio design pieces on paper and with electronic tools. Prerequisite: FA 201 or permission of instructor. Laboratory fee, \$100.
- 248 **Independent Research in Fine Arts (1 to 6)** Staff
For master's degree candidates; open to limited number of qualified undergraduates, with permission. Independent research arranged in consultation with individual instructor and graduate advisor. May be repeated for credit. Laboratory fee depending on area chosen. (Fall and spring)
- 249 **Theory and Practice (3)** Costigan
Stimulation and articulation of personal creativity and critical and presentational skills. Emphasis on visual diaries, problems of individual artistic production, and peer interaction on issues in contemporary art and design. Recommended for graduate students in all areas before the thesis and for senior majors with permission of instructor. Laboratory fee, \$24.

- 250 Design and Construction of Woven Textiles (3)** Staff
Design and construction of various types of woven textiles. Independent research on historic sources and techniques. The creative process and design development. Prerequisite: FA 201 or permission of instructor. Laboratory fee, \$100.
- 251 Advanced Ceramic Design in Wheel Throwing (3)** Ozdogan
Individual projects on the potter's wheel. Student establishes personal style and direction and perfects skills. Either pottery or sculptural approaches encouraged. Research in clays, glazes, and firings is required. Laboratory fee, \$105. (Fall and spring)
- 252 Mosaic Design Applications (3)** Ozdogan
Advanced study and execution of ceramic murals and sculpture for indoor and outdoor architectural spaces. Extensive student technical research, including special cutting techniques, laboratory tests of clay glazes, and firings. Laboratory fee, \$105. (Fall and spring)
- 253 Industrial Ceramic Design/Mold Making (3)** Ozdogan
Architectural and sculptural forms. The multiple production process from model making to finished duplicate form as it exists on factory level. All aspects of model designing and making in clay and plaster; mold making in plaster; production methods from molds including press molding and slip casting. Laboratory fee, \$105. (Fall and spring)
- 254 Advanced Ceramic Technology (3)** Staff
A thorough investigation of specific ceramic materials, clay bodies, and glazes, with an emphasis on calculation and formulation, alteration, and firing. Prerequisite: Art 151 or approval of instructor. Laboratory fee, \$105.
- 255-56 Printmaking: Advanced Screenprinting (3-3)** Staff
Utilization of principles and techniques of serigraphy toward development of personal statement and style. Prerequisite: FA 143-44. Laboratory fee, \$75 per semester. (Academic year)
- 257-58 Printmaking: Advanced Intaglio (3-3)** Barnhart
Advanced practical problems of intaglio methods. Traditional, photo, and transfer processes are covered. Prerequisites: FA 157-58. Laboratory fee, \$54. (Fall and spring)
- 259 Printmaking: Advanced Lithography (3)** Barnhart
Individual problems dealing with printing editions from stone or plates. Photo and transfer processes are covered. Prerequisite: FA 175. Laboratory fee, \$54.
- 260 Printmaking: Advanced Relief (3)** Barnhart
Advanced problems dealing with printing relief images from traditional or non-traditional surfaces. Black-and-white and color. Small and large format. Prerequisite: FA 153. Laboratory fee, \$54. (Fall and spring)
- 261 Advanced Computer-Aided Drafting for Interiors (3)** Staff
Prerequisite: FA 203. Laboratory fee, \$100.
- 265-66 Painting IV (3-3)** Woodward
Alternatives in pictorial dynamics. Assigned studio and independent problems in alla prima and mixed techniques. Material and model fee, \$45 per semester. (Academic year)
- 267-68 Individual Problems in Photography (4-4)** Staff
Limited to M.F.A. candidates and qualified undergraduates. Prerequisite: Permission of instructor and approval of project prior to registration. May be repeated for credit. Laboratory fee, \$100 per semester. (Academic year)
- 275 Painting V (3)** Woodward
Development of personal imagery. Individual problems and critiques. Material and model fee, \$45.
- 277 Advanced Visual Communication: Packaging Design and Illustration (3)** Molina
Advanced studio projects. May be repeated for credit provided the content differs. Laboratory fee, \$100. (Fall and spring)
- 278 Advanced Visual Communication: Problem Solving and Applied Design (3)** Molina
Advanced studio projects. May be repeated for credit provided the content differs. Laboratory fee, \$100. (Fall and spring)
- 279-80 Sculpture IV (3-3)** Gates
Advanced study aimed at development of concept and style. Prerequisite: permission of instructor. Laboratory fee, \$35. (Academic year)

- 281 **Sculpture V (3)** Gates
Emphasis on individual sculptural concepts and materials. Prerequisite: permission of instructor. Laboratory fee, \$35. (Fall and spring)
- 284 **Studio in Historic Interiors (3)** Staff
Exploration and interpretation of significant periods of interior design through the study of historic furniture, decorative art, and architecture. Application of historic styles for restoration or adaptive use in interior environment. Prerequisite: AH 169 and 170. Laboratory fee, \$100.
- 285 **Environmental Analysis in Interior Design (3)** Staff
Evaluation of interior spaces for effectiveness and coherence. The effect of the built environment on human behavior. Factors that contribute to functional and dysfunctional design for interiors.
- 289 **Presentation Techniques (3)** Staff
Development of multimedia techniques in rendering. Advanced three-dimensional drawing using rapid visualization techniques, sketching, and constructed drawings. Laboratory fee, \$100.
- 290 **Interior Design Practicum (3)** Staff
Students work with professional interior designers, architects, or industry-related professionals, participating in implementation of information and skills in project-based setting. Roles and responsibilities of the professional interior designer: business procedures, legal implications, ethics, trade relations, designer-client-contractor relations. Prerequisite: FA 243.
- 292 **Seminar in Interior Design (3)** Staff
Application of advanced topics in design theory; research methodology applied to development of the graduate project. Prerequisite: completion of all other program requirements; taken concurrently with FA 293.
- 293 **Graduate Project in Interior Design (3)** Staff
Application of design skills and knowledge to student-selected project. Emphasis on individual development of the design process, problem-solving skills, and evaluation and defense of the project. Prerequisite: completion of all other program requirements; taken concurrently with FA 292. Laboratory fee, \$100.
- 299-300 **Thesis Research (3-3)** Staff
Laboratory fee depending on area chosen.

FORENSIC SCIENCES

Professors J.E. Starrs, W.F. Rowe, D.A. Rowley (*Chair*)

Associate Professor N.T. Lappas

Assistant Professors D.R. Foran, E.M. Robinson

Adjunct Professor E.A. Vincze

Professorial Lecturers M.M. Christian, J.G. Jackson, M.H. Coggins, H. Deadman, M. Heaney, H. McLean

Associate Professorial Lecturer S.R. Lorigo

Assistant Professorial Lecturers W.E. Clancy, D.A. Pluchinsky, D.C. Mount, G.B. Richards, D.I. Salem, T. Spitzer, M.J. Bonanno, G.D. Hackney, E. Hayes, J.E. Miller, B. Pearson, J. Trump

Master of Forensic Sciences—Required: the general requirements stated under Columbian College of Arts and Sciences. Students must complete 36 credit hours of approved course work. ForS 220, 221, 224, and 225 are required of all students. ForS 224 may be waived for students having an LL.B. or J.D. degree from an accredited law school. The following are also required: (1) 9 hours selected from ForS 201, 202, 203, and 204; (2) 9 hours selected from ForS 214, 260, 261, 265, and 269; (3) the remaining credit hours must be selected in consultation with the advisor from the behavioral sciences, law, management science, or forensic sciences. It is strongly recommended that students participate in the forensic sciences practicum. All candidates are required to pass a written Master's Comprehensive Examination.

Master of Forensic Sciences with a concentration in forensic molecular biology—Prerequisite: a bachelor's degree in the biological or physical sciences from an accredited college or university. Course work in biochemistry and genetics is required.

Required: the general requirements stated under Columbian College of Arts and Sciences. The program of studies consists of 36 credit hours of approved course work. ForS

201, 220, 224, 254, 271; Bioc 250; BiSc 228; and Stat 127 are required of all students. All candidates are required to pass a written Master's Comprehensive Examination.

Master of Science in Forensic Science—Prerequisite: a bachelor's degree in the biological or physical sciences from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 30 credit hours of course work, plus a thesis (equivalent to 6 credit hours). Individualized programs of study will be developed to meet the career objectives of each student. Students may specialize in forensic chemistry, toxicology, or molecular biology. Each such program of study must include ForS 224, 225, and 299-300. The remaining credit hours must be selected from approved courses in the forensic sciences, biological and physical sciences, management science, law, or basic medical sciences. Requirements for the molecular biology specialization are similar to those listed above for the concentration in forensic molecular biology. All candidates are required to pass a written Master's Comprehensive Examination.

Master of Arts in the field of criminal justice—This degree program is a joint offering of the Department of Forensic Sciences and the Department of Sociology. See Sociology.

Master of Arts in the field of criminal justice with a concentration in computer fraud investigation—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 36 credit hours of approved course work drawing upon the forensic sciences, law, accounting, computer science, investigative techniques, and management; ForS 231, 233, 234, and Stat 104 are the core courses; the remainder of the program is chosen from ForS 224, 225, 232, 235, 249, 250, 262, 263, 264, 274, 295, 298. All candidates are required to pass a written Master's Comprehensive Examination. It is strongly recommended that students participate in the forensic sciences practicum.

Master of Arts in the field of criminal justice with a concentration in security management—Required: the general requirements stated under Columbian College of Arts and Sciences. Students must complete 36 credit hours of approved course work. The program of study consists of course work drawing from the forensic sciences, law, criminology, management science, and investigative techniques; ForS 231, 233, 234, and Stat 104 are the core courses; the remainder of the program is chosen from ForS 236, 237, 242, 243, 244, 247, 248, 249, 250, 255, 257, 295, 298. All candidates are required to pass a written Master's Comprehensive Examination. It is strongly recommended that students participate in the forensic sciences practicum.

Five-Year Bachelor of Science with a major in chemistry/Master of Science in Forensic Science with a concentration in forensic chemistry—See the Undergraduate Programs Bulletin.

Programs offered by the Department of Forensic Sciences may include course work from the School of Business and Public Management, the School of Medicine and Health Sciences, and graduate course work in the behavioral, biological, and physical science departments of the University. Students work closely with their advisors in setting up a program that meets their interests, needs, and background knowledge. The Department of Forensic Sciences is affiliated with the Armed Forces Institute of Pathology, Armed Forces Medical Examiner, Armed Forces DNA Identification Laboratory, Bode Technology Group, Fairfax Identity Laboratories, U.S. Secret Service, Naval Criminal Investigative Service, District of Columbia Medical Examiner's Office, and with the Council of Higher Education, Commonwealth of Virginia, in programs of mutual exchange of students, courses, and facilities.

In addition to the degrees listed here, the Department of Forensic Sciences offers graduate certificates in security management and in computer fraud investigation.

A research field in forensic chemistry is available in the Ph.D. program in the Chemistry Department.

201 Forensic Biology (3)

Foran

Principles of the forensic analysis of blood and other biological materials. Specific procedures and techniques used in forensic biology and serology. Laboratory exercises.

202 Instrumental Analysis (3)

Rowe

Principles and application of various instrumental methods to the examination of physical evidence, including chromatographic and spectroscopic techniques and mass spectrometry. Laboratory exercises.

- 203 **Examination of Questioned Documents (3)** Richards, Spitzer
Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture and fiber analysis; studies of paper and methods of examining questioned documents.
- 204 **Firearms and Toolmark Identification (3)** Rowe, Robinson
Methods for identifying firearms, bullet cartridge casings, toolmarks, gunshot residue, obliterated serial numbers, tire marks, and footprints. Laboratory exercises.
- 214 **Forensic Psychiatry (3)** Christian, Jackson
Introduction to the constructs of dynamic psychiatry, psychiatric treatment, and the nomenclature of mental disorders. Consideration of expert testimony, direct examination, and cross-examination in hospitalization and criminal cases.
- 220 **Physical Aspects of Forensic Sciences (3)** Rowe, Spitzer, Robinson
Survey of forensic physical sciences; fingerprints, firearm and toolmark examinations, document examinations, and examinations of trace evidence, such as glass, soil, paint, hairs, and fibers; crime scene investigations; qualifications and preparation of expert witnesses; operation and functioning of the forensic science laboratory.
- 221 **Biological Aspects of Forensic Sciences (3)** Foran, Rowe
Principles of forensic serology, molecular biology, population biology, wildlife biology, entomology, anthropologic pathology, and toxicology. The role of the forensic laboratory in the identification of human remains; determination of the time, cause, and manner of death; partial individualization of biological materials; and the action of drugs.
- 224 **Criminal Law I (3)** Staff
Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and methods of legal research.
- 225 **Criminal Law II: Evidence (3)** Staff
Procedural rules affecting the collection and use of physical evidence. Emphasis on court opinions defining the rules of search and seizure and admissibility of evidence. Prerequisite: ForS 224.
- 229 **Criminal Law IV: Contracts (3)** Salem
Concepts and principles of law encountered in commercial activities: contracts, sales, negotiable instruments, and bankruptcy. Emphasis on recognition of deceptive contracting practices. Statutes and government regulation governing contracts.
- 231 **Risk Management (3)** Staff
Overview of the risk management process; how to identify and analyze loss exposures; feasibility of alternative risk management techniques and forecasting.
- 232 **Forensic Accounting (3)** Lorigo
Principles of accounting: abuse and misuse of accounting procedures; use of accounting in the investigation of commercial crime.
- 233 **Security Management (3)** Staff
Factors that shape modern security management: technology, law, ethics, and societal changes. The course focuses on risk assessment and the necessity to identify, analyze, and understand threat.
- 234 **Protection of Information Systems (3)** Staff
Basic techniques of cost-effective protection of automated information, including backup, disaster management, and intrusion.
- 235 **Conspiracy (3)** Staff
Legal definition of conspiracy; quantum of proof; use of investigative techniques to establish the existence of criminal conspiracies.
- 236 **Physical Security (3)** Staff
Overview of intrusion detection, closed-circuit television, guard force, and automated information security systems. Preparing proposals, negotiating contracts, and preparing budgets.
- 237 **Personnel Security (3)** Staff
Principles of personnel security: personnel security investigations and pre-employment screening. Assertive behaviors to keep the workplace safe and avoid liability exposure to negligent hiring.
- 238 **Security Contracting with Federal and State Entities (3)** Staff
Federal and state procurement practices from the viewpoint of a prospective security service provider.

- 240 Principles of Toxicology (4)** Lappas
Concepts of toxicology, including its historical development and modern applications, drug disposition, mechanisms of toxicity; factors that influence toxicity and toxicity evaluation.
- 242 Security Case Law (3)** Staff
Negligence and liability, intentional torts, compensatory and punitive damages, and contract law. The exercise of security functions by private individuals and organizations.
- 243 Protection of Business Assets (3)** Staff
Risk analysis, security surveys, financial planning for loss prevention, and security management programs and countermeasures; issues in economic espionage. Prerequisite: ForS 233.
- 244 Ethics and Corporate Social Responsibility (3)** Staff
The values, duties, and obligations exercised by a business entity with respect to the society in which it operates. The social responsibility of companies toward the environment, within the workplace, and with customers.
- 245 Analytical Toxicology (4)** Lappas
A study of qualitative and quantitative principles and procedures used in the detection, identification, isolation, purification, and potency determination of drugs.
- 246 Environmental Toxicology (3)** Lappas
A study of the chemical substances to which humans are unintentionally exposed. Emphasis on pesticides, food additives, and air pollutants.
- 247 Violence in the Workplace (3)** Vincze
Assessing and managing threat. Personality types most likely to become violent under pressure; methods and strategies for dealing with high-risk employees before, during, and after an incident; non-employee threats; harassment, stalking, and workplace violence policies, procedures, and plans; legal implications; and theories for effectively lowering the risk of violence in organizations.
- 248 Emergency Planning and Business Continuity (3)** Staff
Approaches used to develop effective plans for managing emergency situations and ensuring business continuity when disasters occur.
- 249 Industrial Espionage (3)** Staff
Computer crime; economic espionage; approaches to prevention and detection; current theories on cyberterrorism.
- 250 Interdisciplinary Aspects of Forensic Science (3)** Robinson
Legal aspects of search and seizure; crime scene documentation techniques; fingerprint processing methods; collecting impression evidence; locating and enhancing blood and body fluids; blood spatter pattern analysis.
- 251 Moot Court (3)** Staff
Students prepare and present direct testimony and are cross-examined by an experienced trial attorney in simulated courtroom setting. Class discussions of problems, techniques. Lectures on discovery, admissibility of scientific evidence, chain of custody, use of notes, etc. Prerequisite: ForS 224.
- 254 Selected Topics (3)** Staff
Current issues in research, investigation, and law.
- 255 Managing Staff Functions in a Security Organization (3)** Staff
Principles of management: ethics, motivation, communication, equal opportunity. Essentials of budgeting, auditing, and security surveys. Introduction to policy and program evaluation in a security environment.
- 257 Organizational Behavior in the Security Profession (3)** Staff
Basic concepts of individual, group, and organizational behavior. Specific management and leadership models and approaches to workplace crime problems. Case studies in a variety of organizational settings.
- 260 Principles of Forensic Medicine (3)** Staff
Anatomy and physiology of the human body, with emphasis on understanding the processes underlying traumatic and unexpected deaths encountered in forensic pathology. Bone growth and repair as it relates to child abuse, structure and functions of the heart as related to sudden death, and anatomic area of the brain prone to hemorrhagic lesions following trauma.
- 261 Principles of Forensic Pathology (3)** Staff
Terminology and scientific techniques used in medico-legal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

- 262 **Computer Forensics: Infoterrorism (3)** Staff
The threats to, and vulnerabilities of, computer systems and how to minimize them. The latest computer technology available to protect automated information. Prerequisite: ForS 234. Open to degree candidates only.
- 263 **Computer Forensics: Fraud Investigations (3)** Staff
Techniques used to detect computer fraud and gather probative evidence to secure a conviction under federal law. Prerequisite: ForS 263. Open to degree candidates only.
- 264 **Computer Forensics: Advanced Techniques (3)** Staff
How to determine how a system was penetrated and what was done while the hackers were in the system. Practical exercises, mock trial, and final paper. Prerequisite: ForS 262 and 263. Open to degree candidates only.
- 265 **Drugs of Abuse (3)** Lappas
Chemical, pharmacological, toxicological, and pathological characteristics of commonly abused drugs, including ethanol, barbiturates, narcotics, stimulants, and hallucinogens.
- 268 **Photography in the Forensic Sciences (3)** Robinson and Staff
Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee, \$35.
- 269 **Forensic Toxicology I (3)** Lappas
Relevant underlying biological, chemical, and pharmacological principles of forensic toxicology. Prerequisite: ForS 270 or permission of instructor.
- 270 **Medicinal Chemistry (3)** Lappas
Theory and principles of classification, synthesis, and structure activity relationships of drugs. Discussion of the complex chemical events that take place between administration of a drug and its action on the user, with emphasis on drugs of abuse.
- 271 **Forensic Molecular Biology (3)** Foran
Advanced methods in forensic molecular biology. Laboratory examinations and classifications of dried blood and other biological materials through a variety of nuclear and mitochondrial markers. Independent laboratory projects. Laboratory fee, \$50. Prerequisite: ForS 254 (DNA Profiling) and permission of instructor.
- 272 **Forensic Toxicology II (3)** Lappas
Lectures, student seminars, and projects dealing with topics of current interest in forensic toxicology. Prerequisite: ForS 269 or permission of instructor.
- 273 **Forensic Chemistry I (3)** Rowe
Examination of glass and soils. Laboratory exercises include refractive index measurements using immersion methods; polarized light observations of minerals; x-ray diffraction analysis of minerals; and classical chemical and physical methods of analysis. Prerequisite: ForS 202 or permission of instructor. Laboratory fee, \$35.
- 274 **Management of Criminal Justice Organizations (3)** Staff
Theories of management with emphasis on leadership. Interaction of individuals, groups, managers, and the organization as a whole. Discussions center on the criminal justice system.
- 280 **Forensic Chemistry II (3)** Rowe
Examination of arson accelerants, textile fibers, plastics, and paints. Laboratory exercises include infrared spectrometry and pyrolysis—gas—liquid chromatography of polymeric materials, as well as classical chemical and physical methods of analysis. Prerequisite: ForS 273 or permission of instructor. Laboratory fee, \$35.
- 295 **Research (arr.)** Staff
Open to qualified master's degree students. Research on problems approved by the department chairman or academic advisor, under the supervision of an appropriate staff member.
- 298 **Forensic Sciences Practicum (arr.)** Staff
Open to qualified master's degree students. Internship experience in a forensic science laboratory or criminal justice agency, under the supervision of an appropriate staff member. Students must preregister for this course.
- 299–300 **Thesis Research (3–3)** Staff

GENETICS

D.E. Johnson (*Director*), M.W. Allard, J. Battey, P.E. Berg, J. Brady, K.M. Brown, A. Chiamello, J. Chou, P. Cogen, A. Colberg-Poley, N. DiFronzo, R. Donaldson, W. Drohan, D. Goldman, G. Hager, E. Hoffman, C. Holland, V.W. Hu, J. Keller, K.A. Kennedy, A. Kumar, S. Ladisch, J.W. Larsen, P. Latham, B. Lu, R. Mage, R. McKay, C.R. Merrill, S. Moody, T.W. Moody, B. Moss, S. O'Brien, S. Patierno, M. Rose, B. Safer, T. Sargent, J. Schlom, D. Scott, L.C. Smith, S. Spence, D. Stephan, M. Stepp, J. Winkles

Columbian College of Arts and Sciences offers an interdepartmental program leading to the degrees of Master of Science and Doctor of Philosophy in the field of genetics. This program is directed by a committee whose members are drawn from the Departments of Anatomy and Cell Biology, Biochemistry and Molecular Biology, Biological Sciences, Microbiology and Immunology, Obstetrics and Gynecology, Pathology, and Pharmacology and from government agencies and private industry.

Requirements for admission are stated under Columbian College of Arts and Sciences. The undergraduate program must have included the following: 8 credit hours each in biology, inorganic chemistry, and organic chemistry, and 6 credit hours in physics. Two upper-level undergraduate courses in genetics, cell biochemistry, or cell or molecular biology are required for the M.S. and strongly recommended for the Ph.D. program.

Master of Science in the field of genetics—Required: the general requirements stated under Columbian College of Arts and Sciences. The 30 credit hours required in this program must include Gnet 201 and Gnet 299–300. The remaining 22 credit hours of course work are to be selected with the approval of the Committee on Genetics.

Doctor of Philosophy in the field of genetics—Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study must include the biomedical sciences core curriculum, Gnet 301, 10–12 credit hours of genetics, and 3 credit hours of statistics.

In addition to the courses listed here, the Genetics Program Office maintains a list of approved courses that may apply to its degree programs, including courses drawn from biological sciences, statistics, public health, and the departments and programs within the biomedical sciences.

201 Advanced Problems in Genetics (2)

Lectures on selected topics by members of the Committee on Genetics. Required of all master's degree candidates in the Genetics Program. Prerequisite: degree candidacy or permission of program director. (Fall)

256 Molecular Genetics of Inherited Diseases (2)

Biochemical aspects of genetics and contributions of molecular biology to understanding of human mutations and hereditary diseases. Prerequisite: degree candidacy or permission of program director. (Spring)

260 Molecular Genetics of Proteins (3)

Laboratory techniques in gel electrophoresis and electroelution, high pressure liquid chromatography protein blotting, proteolytic and chemical cleavage of proteins, amino acid analysis, automated Edman degradations, peptide synthesis and computer-assisted analysis of protein structure. (Fall, even years)

295 Research (arr.)

Open to qualified master's degree students. Research on problems approved by the Committee on Genetics. May be repeated for credit. (Fall and spring)

299–300 Thesis Research (3–3)

301 Advanced Problems in Genetics (2)

Lectures on selected topics by members of the Committee on Genetics. Required of all Ph.D. candidates in the Genetics Program. Limited to students enrolled in the Genetics Program unless special permission is obtained from the director. (Fall)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

GEOGRAPHY

Professor D.C. McGrath (Chair)

Associate Professor M.D. Price

Assistant Professors D. Fuller, E. Chacko, I.K. Cheung, L.M. Benton

Professorial Lecturers G.T. Foggin, P. Mobley, E. Bruner

Assistant Professorial Lecturers W.J. Mallett, L. Marcus, M. Zeigler

Master of Arts in the field of geography—Prerequisite: a bachelor's degree with a major in geography or in a related field in the social or natural sciences.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work must include Geog 105 (*Techniques of Spatial Analysis*) and Geog 201.

Thesis and nonthesis options are available: The thesis option requires a minimum of 30 credit hours of course work, including Thesis Research; the nonthesis option requires completion of 36 credit hours of graduate work. All degree candidates must take a Master's Comprehensive Examination that covers the substance of academic work pursued under the program of study.

Students entering the program without a bachelor's degree with a major in geography will be required to take prerequisite courses as determined by the department. All entering students must have completed one course, or its equivalent, from each of the following groups: physical/resource geography (Geog 108, 132, 135); population/cultural/political geography (Geog 127, 145, 146); urban/economic geography (Geog 125, 140, 141).

Depending upon the chosen field of specialization, each student will select electives from appropriate courses within the department or from related programs and departments within the University or the Consortium of Universities. The student's program of study will be developed in consultation with the advisor and graduate committee.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

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| 201 | Geographic Thought and Methods (3) | Price |
| | For first-year master's students, a survey of geographic thought, theories, and methods. Emphasis on contemporary issues in geography and urban planning and on the development of research. | |
| 207 | Land Development Planning (3) | McGrath |
| | Selected problems in urban and regional planning; applications of zoning, environmental controls, tax incentives, and other techniques available for the implementation of development plans. | |
| 208 | Land Use and Urban Transportation Planning (3) | Marcus |
| | Relationships between land use and the movement of goods and people. Examination of land use and transportation planning principles, issues, and techniques. Roles of public and private interests in land use and transportation planning and management. | |
| 219 | Seminar: Climatology (3) | Cheung |
| | Atmospheric circulation systems, controls, and distribution. Elements of synoptic climatology, including climate modeling. | |
| 220 | Seminar: Climatic Change (3) | Cheung |
| | Examination of natural and human-induced climatic change, at global, regional, and local scales. | |
| 222 | Seminar: Resources and the Environment (3) | Fuller |
| | Analysis of the spatial variations and interrelationships of resources and the environment, using geographic information systems. Prerequisite: permission of instructor. Laboratory fee, \$55. | |
| 223 | Seminar: Population and Health (3) | Chacko |
| | Spatial problems associated with the dynamics and interaction of population health. | |
| 224 | Seminar: Political Geography (3) | Zeigler |
| | Examination of the political factor in location theory and analysis of the nature of political territories. | |
| 225 | Seminar: Transportation and Development (3) | Staff |
| | Transportation and communication in the organization of space. | |
| 230 | Seminar: Environmental Issues in Development (3) | Fuller |
| | A consideration of the differential regional implications of and responses to resource and environmental policy decisions due to regional differences in societal and physical parameters. | |

- 243 **Seminar: Urban Geography (3)** McGrath
Evolving morphology and internal spatial patterns of cities.
- 244 **Seminar: Urban Systems and Development (3)** Staff
Central place theory and other theories of urban location and the organization of systems of cities.
- 250 **Regional Development (3)** Chacko
Geographic perspectives on theory, planning, and programmatic aspects of regional development, with case studies.
- 261 **Geographical Perspectives on Latin America (3)** Price
Political and economic factors in a development context; emphasis on natural and human resources and environmental and land use issues.
- 265 **Seminar: Geography of the Former Soviet Union (3)** Staff
Survey of the regions and major topical themes of the geography of the former Soviet Union, including population, energy, agriculture, transportation, and regional development.
- 266 **Seminar: Geographic Perspectives on Contemporary China (3)** Cheung
China's development prospects: environmental constraints, population growth, and regional differences in the context of Chinese cultural patterns and political organization.
- 290 **Principles of Demography (3)** Boulrier
Same as Econ/Soc/Stat 290.
- 291 **Methods of Demographic Analysis (3)** Boulrier
Same as Econ/Soc/Stat 291.
- 295 **Research (arr.)** Staff
May be repeated for credit.
- 299-300 **Thesis Research (3-3)** Staff

HISTORY

Professors H.M. Sachar, R. Thornton, P.F. Klarén, R.E. Kennedy, Jr., W.H. Becker, L.P. Ribuffo, E. Berkowitz (*Chair*), R.H. Spector, J.O. Horton, L.L. Peck, H. Judson (*Research*), M.E. Saperstein, R.J. Cottrol, D.K. Kennedy, A.M. Black (*Research*), M.A. Atkin

Associate Professors A.D. Andrews, R.B. Stott, H.L. Agnew, E.A. McCord, C.E. Harrison, D.R. Khoury, T. Anbinder, J. Hershberg, H.M. Harrison.

Assistant Professors A.L. Alexander, D. Yang, S. McHale, N. Comfort, N.G. Seavey (*Research*), E.A. Fenn, A. Zimmerman, K.W. Larsen, M. Norton, N. Blyden, G.A. Brazinsky, H. Abugideiri

Adjunct Associate Professor K. Bowling

Director and Principal Investigator of the First Federal Congress Project C. Bickford

Master of Arts in the field of history—Prerequisite: a bachelor's degree from an accredited college or university with a major in history, or with substantial course work in history of high academic quality; high scholastic standing; and approval of the department.

Required: the general requirements stated under Columbian College of Arts and Sciences and reading knowledge of one foreign language. A thesis program consists of a minimum of 30 credit hours of 100- and 200-level courses, including Hist 299-300, Thesis Research, and at least three other 200-level courses. A non-thesis program consists of a minimum of 36 credit hours of 100- and 200-level courses, including at least six 200-level courses, two of which must be research seminars. (See the Undergraduate Programs Bulletin for a listing of 100-level courses offered by the department.) Exceptions to the minimum for 200-level courses can be granted only by the department's Graduate Programs Committee. Hist 201 is required of candidates who have not previously had a course in historiography and historical method. A maximum of 6 credit hours may be in approved courses outside the History Department. To receive graduate credit for 100-level courses, master's candidates must arrange for extra work with the instructors. Each student works in one major and one minor field. A major field consists of 15 credit hours. Major fields are listed below, under the Doctor of Philosophy in the field of history. A minor field consists of a minimum of 9 hours in any of the major fields or in another relevant field agreed upon between the advisor and student. The student is required to pass a comprehensive examination in a major field.

Master of Arts in the field of history with a concentration in historic preservation—Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-hour degree program combines courses in United States history and historic

preservation. It includes at least 18 hours of U.S. social history, U.S. urban history, man-made America, and the seminar sequence in historic preservation. For other course distribution requirements, see the departmental graduate advisor. Candidates in this program may also be required to pass an examination in measured architectural drawing.

Master of Arts in the field of history with a concentration in imperial and colonial studies—Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-hour degree program emphasizes the comparative study of empires. Hist 242 and 243 are required, along with a 15-hour major regional field and a 6-9-hour minor regional field. Up to 9 hours may be chosen in related disciplines within the University. See the department graduate advisor for course and distribution requirements and the thesis option.

Master of Arts in the field of history with a concentration in public policy—Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-hour degree program emphasizes the study of history as it relates to the analysis and conduct of public policy. Hist 214 and an internship are required. Additional course work is to be chosen with advisor's approval.

Master of Arts in the field of history with a concentration in U.S. legal history—Required: the general requirements stated under Columbian College of Arts and Sciences. This 36-hour degree program combines a major field in U.S. history with a special field in U.S. legal history. Students may take up to 9 hours of legal history offered by the Law School. For other course distribution requirements and the thesis option, see the departmental graduate advisor.

Doctor of Philosophy in the field of history—Required: the general requirements stated under Columbian College of Arts and Sciences, including the passing of a written examination in two appropriate foreign languages or in one foreign language and an approved subject (such as statistics or oral history), and the satisfactory completion of the General Examination in four fields.

Candidates in American history must select two major fields from early America (to 1815), nineteenth-century America (1815-1900), and twentieth-century America (1900-). Their two minor fields will normally be topical (e.g., U.S. social, U.S. diplomatic, historic preservation).

Candidates in imperial and colonial history take Hist 242 and 243 and select two major and two minor fields/periods. The student should consult with the graduate committee on the combination of courses to be taken. Fields can include, but are not limited to, such combinations as Europe and the Americas (1500-1900), Europe and Asia, Europe and the Middle East, Europe and Africa, the U.S. and Asia, and China and Japan.

Candidates in Asian history must select two major fields from modern China, modern Japan, and modern Southeast Asia. Their two minor fields will be chosen in consultation with their graduate committees. Major field exams are five hours in length; minor field exams, four hours.

Candidates concentrating in areas other than those outlined above must select one major and three minor fields. Major fields are early modern Europe, modern Europe, Latin America, modern Middle East, modern Eastern Europe, modern Russia, and military history. Their three minor fields may be either topical (e.g., European intellectual) or chronological (e.g., Tudor and Stuart England, colonial Latin America). Major field exams are six hours; minor field exams, four hours.

All candidates may choose to be examined in one minor field other than history if it is relevant to the program of study. Students having a minor field in historical preservation may be required to pass an examination in measured architectural drawing.

Doctor of Philosophy in the field of American religious history (offered in cooperation with the Department of Religion)—Required: the general requirements stated under Columbian College of Arts and Sciences and the specific requirements of the Doctor of Philosophy in the field of history, stated above. The General Examination must cover four fields, including two from the Department of History (generally American social history and one other) and two from the Department of Religion (history of religion in America and one other field in religious history).

Note: Undergraduates may register for graduate courses only with permission of instructor.

- 201 History and Historians (3)** Zimmerman, Stott
 Historiography and historical method for graduate students. Readings and discussions on major trends in history; selections from classics of historical literature. Students who receive credit for Hist 201 cannot receive credit for Hist 198. (Spring)
- 203-4 Seminar: Research or Readings (3-3)** Staff
 Offered on demand for individual research programs. Prerequisite: approval of department. (Academic year)
- 205-6 Seminar: Eastern European History (3-3)** Agnew
 Hist 205: 1772-1918; Hist 206: 1919-1945. (Academic year)
- 212 Nature vs. Nurture in American History (3)** Comfort
 Social and cultural survey of the uses of biology in addressing social problems, including social Darwinism, eugenics, scientific medicine, DNA forensics, and cloning.
- 214 Seminar: History and Public Policy (3)** Berkowitz
 Seminar in the use of historical insights and methods in policymaking, with emphasis on domestic issues. Assessment and use of primary sources for policy analysis and the use of historical analogy in policy formulation.
- 217 Seminar: Russian and Soviet Thought (3)** Atkin
 Selected topics in the intellectual and cultural history of 19th- and 20th-century Russia and Soviet Union. May be taken as a readings seminar or, with instructor's approval, as a research seminar. Admission by permission of instructor. (Spring)
- 218 Readings/Research Seminar: Soviet Nationalities (3)** Atkin
 An examination of the relationship between the USSR's multinational composition and its domestic political, economic, social, and cultural policies and foreign relations. May be taken as a readings seminar or, with instructor's approval, as a research seminar. Admission by permission of instructor. (Spring)
- 219 Internship in History and Public Policy (3 or 6)** Berkowitz
 Supervised participation in an office or agency concerned with the formulation of public policy; terms of the internship are arranged with the director of the History and Public Policy Program. Enrollment restricted to students in the History and Public Policy Program. (Fall and spring)
- 220 American Business History (3)** Becker
 The history of American business institutions in manufacturing, distribution, transportation, and finance. Particular attention will be given to the period since industrialization, with consideration of business institutions in their economic, legal, governmental, and social contexts. Same as SMPP 293. (Spring)
- 224 Readings/Research Seminar: European Intellectual History (3)** E. Kennedy
 Topics in 18th- and 19th-century European thought, with an emphasis on France. Specific topic announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 225 History of Washington, D.C. (3)** Staff
 Same as AmSt 225.
- 228 Topics in Modern Military and Naval History (3)** Spector
 Discussion, readings, and research in 20th-century European and American military and naval history.
- 229 Seminar: World War II (3)** Spector
 Examination of statecraft and the management of force before, during, and after World War II. Special attention to broad aspects of military policy and strategy and their interaction with international politics and diplomacy.
- 230 Readings/Research Seminar: Strategy and Policy (3)** Spector
 A study of the historical development of strategy and the relationship of military thought to national policy.
- 231 The Age of the Battleship: An Introduction to Modern Naval History (3)** Spector
 The rich and varied literature of naval history, with emphasis on interactions among technology, nationalism, and domestic political/social developments in the late 19th and early 20th century. The social history of navies is included. (Spring)

- 232 **Islam and Social Movements (3)** Khoury
An examination of the relationship of religion and religious symbols to social and political movements in the Islamic world. (Fall, alternate years)
- 233 **Nationalism in the Middle East (3)** Khoury
Different interpretations of nationalism and their applicability to nationalism in the Middle East. (Spring, alternate years)
- 234 **Imperialism in the Middle East (3)** Khoury
An exploration of the process of European and American expansion in the Middle East. (Fall, alternate years)
- 237 **Readings/Research Seminar: Soviet Foreign Policy, 1917-1991 (3)** Staff
Concepts and perceptions guiding Soviet relations with the outside world. From the blockade and intervention, through years of isolation, World War II, the Cold War, to "peaceful coexistence."
- 239 **Seminar: Early Modern European History (3)** Staff
Topics selected from Western European history of the 14th through 17th centuries.
- 240 **Seminar: English People and Institutions (3)** Peck
Selected topics in the political, social, intellectual, and economic history of England. Focus upon one time period and special area of interest. May be taken for research credit with instructor's approval. (Fall and spring)
- 241 **Readings/Research Seminar: Modern European History (3)** Staff
Prerequisite: appropriate preparation and consent of instructor.
- 242 **Europe and the World, 1500-Present (3)** D. Kennedy
An introduction to some of the key debates and scholarship concerning European imperialism.
- 243 **Modernization, Imperialism, Globalization (3)** Zimmerman
Readings seminar in classic and recent theories of modernization, imperialism, and globalization. (Spring, alternate years)
- 246 **Readings/Research Seminar: History of Modern Russia and the Soviet Union (3)** Atkin
Selected topics in the domestic history of modern Russia and Soviet Union. May be taken as a readings seminar or, with instructor's approval, as a research seminar. Admission by permission of instructor. (Fall)
- 249 **Research Seminar: European Diplomatic History (3)** Staff
Research seminar in individually selected topics concerning the foreign policies, actions, and interrelations of the European great powers and their statesmen in the 19th or 20th century. Reading knowledge of one language other than English required. (Fall)
- 250 **History of International Systems (3)** Staff
A team-taught world history course designed to acquaint graduate students with varieties of global and imperial political and economic systems that preceded and co-exist with the current global order.
- 251 **Uses of History in International Affairs (3)** Berkowitz, H. Harrison
This course is similar to Hist 250 but with an emphasis on public policy rather than historiography.
- 253-54 **Seminar: History of Sino-Soviet Relations (3-3)** Thornton
Readings seminar designed to develop analytic and historiographic skills. Fall: turn of the century to the Korean War; spring: from the foundation of the People's Republic to the collapse of the Soviet Union and its consequences. (Alternate academic years)
- 255-56 **Seminar: U.S.-Soviet Strategic Relations: World War II to 1991 (3-3)** Thornton
Readings seminar designed to develop a conceptual framework for understanding contemporary U.S.-Soviet relations. Fall: World War II through the Johnson administration; spring: the administrations of Nixon, Carter, and Reagan. (Academic year)
- 257 **Re-thinking Cold War History (3)** H. Harrison, Hershberg
A reading and research course that relies heavily on documents from formerly closed communist archives and recently declassified Western materials. Various issues and events of the Cold War; old and new historiographical controversies. Students write a primary-source research paper to elucidate one of the many aspects of the Cold War about which new evidence is available.

- 259-60 Research Seminar: Problems in U.S.-Soviet-Chinese Relations (3-3)** Thornton
Development of scholarly skills through preparation of a research paper. Prerequisite: Hist 254 or 255 or permission of instructor. (Alternate academic years)
- 261-62 Readings/Research Seminar: Topics in Modern Latin America (3-3)** Klarén
Admission by permission of the instructor.
- 264 Seminar: Immigration and Ethnicity in the United States (3)** Anbinder
Trends and theoretical issues in the study of American immigration and ethnicity.
- 265 Seminar: The Era of the Civil War, 1850-1877 (3)** Anbinder
The sectional crisis that led to the Civil War; the conflict itself in its military, political, and social dimensions; attempts at racial and sectional reconciliation made during Reconstruction.
- 266 Government and Politics of the USSR (3)** Reddaway
Same as PSc 266.
- 267 Seminar: American Social Thought Since World War II (3)** Ribuffo
Consideration of C. Wright Mills, Daniel Bell, Abraham Maslow, Christopher Lasch, Paul Goodman, Martin Luther King, Jr., Barbara Ehrenreich, and other major social critics. (Fall)
- 268-69 Readings and Research in American Cultural History (3-3)** Staff
Same as AmSt 268-69.
- 270 Theory and Practice of Public History (3)** Horton
Same as AmSt 270.
- 271-72 Readings/Research Seminar: U.S. Social History (3-3)** Horton
Hist 271: Readings seminar on American daily life, institutions, and intellectual and artistic achievements. Hist 272: Research seminar. Hist 271 is prerequisite to Hist 272. Same as AmSt 271-72.
- 273 Readings on Women in American History (3)** C. Harrison
Important works in American women's history; evolution of the field in historiographical context. Same as AmSt/WStu 273.
- 274 Readings Seminar: 19th-Century American History (3)** Anbinder
Important trends in historical writing about 19th-century America. (Alternate years)
- 275-76 Readings/Research Seminar: Early American History (3-3)** Fenn
Readings in the fall, research in the spring. Admission by permission of instructor. (Alternate academic years)
- 277-78 Historic Preservation: Principles and Methods (3-3)** Longstreth
Same as AmSt 277-78.
- 282 History of U.S. Foreign Policy, 1898-1990 (3)** Hershberg
Readings, lectures, discussion on major developments in the conduct of American diplomacy. (Fall and spring)
- 283-84 Readings/Research Seminar: Recent U.S. History (3-3)** Ribuffo
Prerequisite: 6 credit hours of 100-level American history courses. Research or readings, depending on students' interests and curricular needs.
- 285 U.S. Legal History (3)** Cottrol
The legal history of the United States from the 17th century to the present. The course examines legal change within the broader context of political, social, and economic change. Admission by permission of instructor. Same as Law 591. (Spring)
- 286 The Law of Race and Slavery (3)** Cottrol
The role of legal norms and processes in developing patterns of slavery and race relations in the United States and other societies. Admission by permission of instructor. Same as Soc 286 and Law 596. (Spring)
- 288 Modern Southeast Asia (3)** McHale
The modern history of Southeast Asia from the 1800s to 1975. Colonialism, rise of postcolonial states, revolutions and persistence of the past. (Fall)
- 289 Seminar: Modern Japanese History (3)** Yang
Selected topics in modern Japanese history from the Meiji Restoration of 1868 to the present. Research or readings depending on students' interests and curricular needs. (Spring)

- 291 **Readings/Research Seminar: 20th-Century History** (3) Sachar
Research or readings on selected topics. (Fall)
- 292 **Readings/Research Seminar: Israel, Zionism, and the Arab World** (3) Sachar
- 293 **Research Seminar: Modern East Asian History** (3) McCord, Yang
- 294 **Research Seminar: The Modern Middle East** (3) Khoury
Readings, discussion, and research in selected political, economic, social, cultural, and intellectual trends. (Spring)
- 295 **Readings Seminar: Late Imperial China** (3) McCord
Selected topics in the history of modern China in the late imperial period, with a particular focus on the internal and external challenges to the last Chinese dynasty in the 19th century. (Fall)
- 296 **Readings Seminar: 20th-Century China** (3) McCord
Selected topics in the history of modern China from the 1911 Revolution to the Cultural Revolution. (Spring)
- 297 **Special Topics Seminar** (3 to 9) Staff
Open to doctoral and master's candidates and qualified undergraduates. May be repeated for credit. Offered whenever five or more students can be enrolled.
- 299-300 **Thesis Research** (3-3) Staff
- 301-2 **Folger Institute Seminars** (3-3) Staff
Topics will be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs. Consult the chair of the department before registration.
- 398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

HOMINID PALEOBIOLOGY

Committee on Hominid Paleobiology

B. Wood (*Chair*), M. Allard, K. Behrensmeyer, A. Brooks, J. Clark, G. Dunston, R. Kittles, J. Long, S. Moody, R. Potts, S. Tishkoff, D.H. Ubelaker

Columbian College of Arts and Sciences offers an interdisciplinary program leading to the degrees of Master of Science and Doctor of Philosophy in the field of Hominid Paleobiology. Participating faculty are drawn from the Departments of Anthropology, Biological Sciences, Anatomy, and Earth and Environmental Sciences at GW; the Departments of Anthropology and Paleobiology at the National Museum of Natural History, Smithsonian Institution; the Department of Microbiology at Howard University; the Departments of Anthropology and Biology at the University of Maryland; and the National Institutes of Health.

A bachelor's degree in anthropology, biology, geoscience, or zoology from this University, or an equivalent degree from another accredited institution of higher learning, is required for admission into the program. Prerequisite:

1) Advanced undergraduate course work in biology, including courses in evolution and any two of the following: genetics, developmental biology/embryology, anatomy, physiology, ethology, ecology, and paleontology. GW courses that correspond to these subjects are BiSc 107, 108, 114, 122, 123, 132, 150, 151, 152, 154, 156.

2) Advanced undergraduate course work in anthropology, including courses in any two of the following: osteology, human biology, paleoanthropology, primatology, and paleolithic archaeology corresponding to Anth 114, 141, 142, 145, 146, 147, 148, 149, 181, 183; course work in statistics corresponding to Stat 91 and 127; course work in mathematics, including precalculus, corresponding to Math 20-21 or 30.

In addition, advanced undergraduate course work in one or more of the following subjects is desirable: chemistry, biochemistry, physics, geoscience, and calculus.

Exceptional applicants who lack some of the prerequisites may be admitted to the program on a provisional basis, but formal admission will be conditional on the satisfactory completion of appropriate deficiency courses in the first year.

Master of Science in the field of hominid paleobiology—Required: the general requirements stated under Columbian College of Arts and Sciences. The program includes 30 credit hours of course work, plus a thesis (equivalent to 6 credit hours). Required courses

include Anth 283, BiSc 210, EES 254, and two laboratory or field research courses in different disciplines. Electives are selected in consultation with the committee from a list of relevant courses in anatomy, anthropology, biological sciences, and geology.

Doctor of Philosophy in the field of hominid paleobiology—Required: the general requirements stated under Columbian College of Arts and Sciences. The program includes a minimum of 48 credit hours of course work, plus a dissertation (equivalent to 24 credit hours). Required courses are Homp 301, 302, 303, and four courses chosen from Anth 142, 283; BiSc 210, 230; and EES 254. The remainder of the course work is to be distributed among various interdisciplinary courses, including but not limited to the following: Anth 146, 247; Anat 210, 260; BiSc 114, 132, 216, 228; EES 140, 255, 263.

Three of the chosen courses must include a substantial independent research project. These research components must involve at least two different disciplines and may include approved field courses. Electives are to be selected as for the master's degree. For detailed requirements, consult the chair of the doctoral program committee.

Research fields: Any subdiscipline of anatomy, anthropology, biology, ecology, or geoscience that pertains to research in the field of hominid paleobiology. At least one of the student's research fields must be in a discipline other than anthropology.

295 Research (arr.)

Research on problems approved by the director of the program. Open to qualified students with advanced training. May be repeated for credit.

299-300 Thesis Research (3-3)

301 Problem-Based Learning Seminar (1 or 2)

Problem-based tutorial in hominid paleobiology. Development of research skills through problem-solving tasks in a small group. May be repeated for credit.

302 Public Understanding of Science Internship (3)

Supervised participation in an institution that presents science to the public. Opportunity to participate in procedures and gain practical experience in disseminating scientific information to non-scientists.

303 Paleobiology Lab Rotation (2 or 3)

Supervised participation in a relevant laboratory. Students learn analytical techniques, handle diverse types of data, and encounter a range of disciplines as preparation for later participation in interdisciplinary research projects. Admission by permission of the program chair. May be repeated for credit.

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

HUMAN DEVELOPMENT and HUMAN RESOURCE DEVELOPMENT

See Counseling/Human and Organizational Studies.

HUMAN SCIENCES: AN INTERDISCIPLINARY PROGRAM IN LANGUAGE, CULTURE, AND SOCIETY

Committee on the Human Sciences

A. Hildebeitel (*Director*), M. Alcorn, J. Anderson, I. Azar, C. Betensky, D. Bjelajac, C. Britt, P.J. Caws, J.J. Cohen, P. Duff, R. Grinker, J.C. Kuipers, M. McAlister, R. McRuer, J. Miller, J.A. Plotz, L.B. Salamon, M.B. Stein, J.-F. Thibault, I.R. Vergara, G. Weiss, A. Zimmerman

Columbian College of Arts and Sciences offers an interdisciplinary program leading to the degree of Doctor of Philosophy in the field of human sciences. The program is administered by a committee whose members are drawn from cooperating departments and programs, which include American Studies, Anthropology, English, Fine Arts and Art History, German and Slavic Languages and Literatures, History, Philosophy, Religion, Romance Languages and Literatures, and Women's Studies.

The program in the human sciences is part of the growing interdisciplinary trend that employs methods and principles common to the humanities and social sciences for examination of culture and meaning. Toward that end, students pursue inquiry in six core areas: archaeology of the human sciences; contemporary theory; language, meaning, and

interpretation; historical issues in the human sciences; culture and society; techniques of critical reading. Along with human sciences courses given under these core titles, the program maintains a list of selected departmental courses that may be taken for each specific core area. In addition, each student pursues a specialization in one of the cooperating departments or in an area approved by the program.

General requirements for the degree are stated under Columbian College of Arts and Sciences. A Bachelor of Arts with a major in one of the cooperating disciplines or a related discipline is required for admission.

The program of study must include the following. (1) 72 credit hours of course work (48 hours for students with master's degrees in related disciplines), which may include up to 24 hours of dissertation research. (2) One designated core course in each of the core areas. (3) Demonstrated proficiency in two foreign languages. (4) A Qualifying Examination following completion of 18 credit hours, with satisfactory performance necessary for continued enrollment in the program. (5) A General Examination that covers the core requirements and the student's chosen concentration. (6) A satisfactory interdisciplinary dissertation.

In addition to core courses, students pursue graduate course work for which they are qualified in any of the cooperating departments. Lists of applicable courses are posted and circulated prior to registration each semester.

201 The Idea of the Human Sciences (3)

Critical inquiry into the genesis and structure of theories that seek to account for human creativity, meaning, and interpretation and their textual, cultural, and institutional embodiments, from antiquity to late modernity.

202 Contemporary Theory in the Human Sciences (3)

Critical examination of major theoretical strategies employed by current practitioners of the human sciences. Topics may include structuralism, hermeneutics, deconstruction, semiotics, and feminist history.

203 Language, Meaning, and Interpretation (3)

Focus on language within a wide domain of inquiry that includes linguistics, semiotics, hermeneutics, narratology, speech act theory, language games, orality, writing, and gender, race, and class.

204 Historical Issues in the Human Sciences (3)

Theoretical examination of history and the nature of historical knowledge. Topics may include philosophies and theories of history, eschatology, pre- and post-colonialisms and modernities, and national histories and mythologies.

205 Culture and Society (3)

Critical examination of cultural practices and social institutions from an interpretive perspective. Selected readings in cultural theory and cultural studies.

206 Techniques of Critical Reading (3)

Critical reading of one or more texts, utilizing the theoretical strategies of the human sciences. For purposes of this course, texts may include any human artifacts or constructions that are invested with meaning.

295 Directed Reading and Research (3)

Supervised reading in selected fields within the human sciences. May be repeated once for credit.

297 Special Topics in Human Sciences (3)

Open to master's and doctoral students. May be repeated for credit provided the topic differs.

310 Advanced Seminar in Human Sciences (3)

Advanced topics, theories, and methods in different fields of the human sciences. Limited to doctoral candidates preparing to do their dissertation. May be repeated for credit provided the topic differs.

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

IMMUNOLOGY

A. Keegan (*Director*), E. DeFabo, S. Ladisch, R. Mage, F. Noonan, J. Schlom, D. Scott, Y. Shi, C. Smith, M. Williams

Doctor of Philosophy in the field of immunology—Prerequisite: A bachelor's degree in biological sciences, chemistry, or a related field.

Required: the general requirements stated under Columbia College of Arts and Sciences. Course work must include the biomedical sciences core curriculum, Immu 230, three semesters of Immu 270, and Stat 225. Recommended electives include Bior 234, 250; Micr 233; Onco 221, 222.

Research fields: Apoptosis, autoimmunity, T-cell development, gene therapy, immune regulation, phylogeny of the immune system, tumor immunology, UV effects on cellular immunity, asthma, allergy.

230 Molecular and Cellular Immunology (3)

Scott

Major aspects of immunology, including T and B cell development, the major histocompatibility complex, and immune regulation. Prerequisite: BmSc 213 or equivalent with approval of staff. (Fall)

270 Advanced Topics in Immunology (3)

Staff

Seminar series on topics chosen jointly by students and faculty: students present and critique original manuscripts. May be repeated for credit. Prerequisite: Micr 229, Immu 230, or approval of staff.

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

INTERNATIONAL AFFAIRS

University Professor J.N. Rosenau

Professors G.M. Adams (*Practice*), C.J. Allen, H.G. Askari, M.A. Atkin, W.H. Becker, E. Berkowitz, B.L. Boulter, M.D. Bradley, N.J. Brown, J. Chaves, J.J. Cordes, H.J. Davis, C.J. Deering, R.M. Dunn, Jr., M.A. East, H.B. Feigenbaum, D. Gow (*Practice*), H. Harding, J. Henig, G. Kaminsky, D.K. Kennedy, R.E. Kennedy, Jr., Y.K. Kim-Renaud, P.F. Klarén, J. Kuipers, P. Lauter, J.M. Logsdon, G. Ludlow, J. Manheim, C. McClintock, I. Millar, B.D. Miller, H.R. Nau, J. Pelzman, J.M. Post (*Practice*), P. Reddaway, B. Reich, W. Reich, L.P. Ribuffo, R. Rodriguez-Garcia, H.M. Sachar, D. Shambaugh, S.C. Smith, M. Sodaro, R.H. Spector, R. Steinhardt, J.-F. Thibault, R. Thornton, S. Wolchik, A.M. Yezer

Associate Professors H.L. Agnew, D. Avant, A. Bowie, R.W. Click, B.J. Dickson, M. Finnemore, J. Goldgeier, M. Gonglewski, D.A. Grier, R. Grinker, S. Hamano, J. Hershberg, D. Khoury, J.H. Lebovic, D.L. Lee, S. Livingston, E.A. McCord, M.M. Mochizuki, M.O. Moore, M. Price, J.A. Quiroga, S. Rehman, R. Robin, F. Robles, P. Rollberg, R.W. Rycroft, S. Sell, S. Suranovic, H.J. Teegan, N.S. Vonortas, G.C.Y. Wang, W. Waters, R. Weiner, H. Wolf

Assistant Professors H. Abugideiri, R.A. Carruth, E. Chako, D. Dassa Kaye, D. Fuller, H.M. Harrison, K.W. Larsen, S. McHale, A. Prakash, J. Ryfa, J.M. Smith, M.B. Stein, J.H. Williams, L. Willnat, D. Yang, A. Zimmerman

Adjunct Professors R. Butterworth, J. Hardt, J. Kilpatrick, S. Johnson, L. Kjonnerod (*Practice*), B. Powers (*Practice*), R. Sutter

Adjunct Associate Professor K. Thachuk

Adjunct Assistant Professors K. Lord, K. Healy

Master of Arts in the field of international affairs—This multidisciplinary program, offered by the Elliott School of International Affairs, provides a framework that prepares students for professional positions in a broad range of international careers. As outlined below, students complete a three-course core field, a four-course major field, skills-based courses, electives, and a capstone course.

Prerequisite: the admission requirements stated under the Elliott School of International Affairs and a bachelor's degree in a related field. Required: the general requirements stated under the Elliott School of International Affairs. All degree candidates must take a minimum of 40 credit hours of course work and may take no more than 21 hours in one department. Students may write a thesis if they meet requirements stated under Thesis Option in the Elliott School section of this Bulletin. Thesis candidates may take no more than 15 hours of course work in any one department.

Core field—The core field consists of Hist 250, PSc 240, and either Econ 280 or Econ 283 and 284. Students choosing international development studies as their major field should

take Econ 250. Students with sufficient academic background may waive any of these core courses with approval of a designated faculty member from the department concerned.

Major field—The major fields include international security studies; international economic affairs; international affairs and development; international public health; technology and international affairs; international law and organizations; conflict and conflict resolution; U.S. foreign policy; Asia; Latin America; Middle East; Europe and Eurasia. Students who choose a regional major field are required to take PSc 230. Program guidelines available from the Elliott School list specific courses that pertain in these major fields. A student may petition the dean to design a special major field.

The academic program must include 3 credit hours of skills-based courses (IAff 201, 202). One credit of IAff 205 may also be applied to this requirement. Specific course offerings are listed in the *Schedule of Classes*.

Reading and oral proficiency in a modern foreign language must be demonstrated during the final 20 hours in residence. Up to 6 hours of foreign language credit may be counted toward the degree.

All degree candidates participate in a capstone course. Students may sign up to participate if they have completed or are registered for 30 of the program's required 40 credits. Those pursuing the thesis option may participate at 28 of the required 34 credits.

Consult program guidelines available from the Elliott School for more details about program requirements.

The following courses carry the International Affairs (IAff) designation. All other courses listed above will be found under the appropriate department designation.

- | | | |
|--------|--|----------------------------|
| 201 | Skills Workshop (1 or 2) | Staff |
| | Short courses designed to focus on developing specialized skills for international affairs professions. Topics announced in the <i>Schedule of Classes</i> . | |
| 202 | Topics Workshop (1 or 2) | Staff |
| | Short courses designed to focus on developing specialized knowledge for international affairs professions. Topics announced in the <i>Schedule of Classes</i> . | |
| 203 | MIPP Seminar and Practicum (3) | Staff |
| | For Master of International Policy and Practice candidates only. | |
| 204 | International Negotiating and Mediating Behavior (3) | Staff |
| 205 | Language Workshop (1 to 3) | |
| | Special courses designed to develop advanced language skills for international affairs professionals. Courses in specific languages announced in the <i>Schedule of Classes</i> . | |
| 206 | International Affairs Capstone Course (0 or 1) | Staff |
| | Open only to graduating M.A. candidates in international affairs. | |
| 207 | Asian Studies Capstone Course (0 or 1) | Staff |
| | Open only to graduating M.A. candidates in Asian studies. | |
| 208 | ITIP Capstone Course (0 or 1) | Staff |
| | Open only to graduating M.A. candidates in international trade and investment policy. | |
| 209 | SPS Capstone Course (0 or 1) | Staff |
| | Open only to graduating M.A. candidates in security policy studies. | |
| 211-12 | Multidisciplinary Seminar in Development (3-3) | Gow and Staff |
| | Assessment of economic, political, social, technological, and environmental factors as they interact to affect development, with emphasis on individual human capabilities, and capabilities of indigenously initiated or administered economic and social organizations. For degree candidates in international development studies only. (Academic year) | |
| 213 | European and Eurasian Studies Capstone Course (3) | Staff |
| | Open only to graduating M.A. candidates in European and Eurasian studies. | |
| 220 | Science, Technology, and Public Policy (3) | Logsdon, Rycroft, Vonortas |
| | Introduction to the study of science, technology, and public policy; focus on policy issues that arise from interactions between scientific and technological developments and government activity. (Fall) | |
| 221 | Technology Creation and Diffusion (3) | Vonortas |
| | Examination of the relationship between invention (inception), innovation (first application), and dissemination (diffusion) of technological knowledge; focus on the technological environment currently prevailing in the major developed market economies with historical references. (Fall) | |

- 222 Technology Cooperation in Strategic Alliances (3)** Vonortas
Examination of technical alliances and joint research ventures: incentives to collaborate, advantages and disadvantages of such agreements for the parties involved, and policy implications. The role of multinational corporations and of smaller, technology-based firms.
- 223 U.S. Space Policy (3)** Logsdon
Investigation of the origins, evolution, current status, and future prospects of U.S. national space policy and the space programs of the U.S. government in their international context. (Fall)
- 224 Issues in U.S. Space Policy (3)** Logsdon
A seminar designed to undertake in-depth analysis of a current space policy issue. Team research format involving preparation of a comprehensive assessment of that issue and policy recommendations regarding its resolution. May be repeated for credit. (Spring)
- 225 Environmental Policy (3)** Rycroft
A seminar examining public policy designed to protect the human and physical environment; focus on the ways science and technology simultaneously create new environmental problems and contribute to their mitigation and prevention. (Spring)
- 229 Multidisciplinary Seminar in Science, Technology, and Global Affairs (3)** Logsdon, Rycroft, Vonortas
The capstone course for STPP, this course combines a lecture series and a workshop on an ongoing science and technology issue. Focus on a cross-disciplinary policy concern. For degree candidates in science, technology, and public policy only. Prerequisite: IAff 220. (Spring)
- 253 Defense Policy and Program Analysis I (3)** Staff
Examination of how national security policy is formulated and translated into a defense budget, program priorities, and force structure. Focus on nuclear forces. (Fall and spring)
- 254 Defense Policy and Program Analysis II (3)** Staff
Analysis of development of national security policy and the use of analytic techniques to derive a defense program and force structure from it. Special attention to general purpose forces. (Spring)
- 255 Applied Quantitative Techniques (3)** Butterworth
The application of quantitative techniques in the solution of issues in defense policy. (Spring)
- 256 National Security Resources (3)** Staff
National security resource planning and the federal budget-making process in relation to international affairs and defense.
- 257 Transnational Security Issues (3)** Staff
The national security challenges posed by transnational threats; policy decision making in response; future trends.
- 281 Taiwan: Internal Development and Foreign Affairs (3)** Staff
A multidisciplinary course that examines the social, political, and economic development in Taiwan since World War II and its foreign affairs.
- 286 Latin America: Problems and Promise (3)** Staff
Multidisciplinary foundation course for the Latin American Studies program. Introduces students to key issues in Latin American studies.
- 287 Problems in Latin American Civilization (3)** Klarén and Associated Faculty
Interdisciplinary capstone course for M.A. candidates in Latin American studies; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)
- 290 Special Topics in International Affairs (3)** Staff
Courses designed to focus on international affairs issues of a current or topical nature. Topics announced in the *Schedule of Classes*.
- 293 Colloquium: National Defense Policies and Issues (3)** Staff
Colloquium for advanced students of security policy studies. Admission by permission of the instructor.
- 295 Colloquium: Europe and Eurasia (3)** Sodaro
Survey of current research on Europe and Eurasia. Research paper required. Required of M.A. candidates in European and Eurasian studies; open to others with permission of the instructor. (Fall)

- 296 **UNA/International Organization Seminar/Internship (3)** Staff
For selected M.A. candidates in the Elliott School. The course includes seminar meetings, an internship at a United Nations agency or related organization, and a research paper.
- 298 **Independent Study and Research (1 to 3)** Staff
Limited to M.A. degree candidates. Written permission of instructor required.
- 299-300 **Thesis Research (3-3)** Staff

INTERNATIONAL BUSINESS

Professors G.P. Lauter, Y.S. Park, H.G. Askari, F. Robles, R. Weiner (*Chair*)

Associate Professors S.S. Rehman, J. Yang, H.J. Teegen, R.W. Click, J. Ferrer (*Research*)

Assistant Professors J.W. Spencer, P. Dastidar, L.A. Riddle, J.J. Forrer (*Research*)

See the School of Business and Public Management for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

- 260 **The New Global Competitive Framework (3)** Lauter, Rehman
How industries develop sustained competitive advantages within the global framework. The European Union's "single market" and the Economic-Monetary Union; the transformation of formerly centrally planned economies; the changing Japanese economy and emerging Pacific Basin, with implications for the U.S. economy, industries, and firms.
- 261 **Multinational Corporations in the World Economy (3)** Staff
Business in a competitive world economy; multinational corporations as economic, political, and social institutions; ownership and growth strategies; national and international controls; functional aspects of international business operations; future of the multinational corporation.
- 263 **Legal Aspects of International and Multinational Business (3)** Staff
Legal environment of international and multinational business including legal systems, antitrust laws, regulation of direct investment, international arbitration and expropriation; topics of current interest.
- 264 **International Business Strategy (3)** Click
Discussion of the changing nature of the international environment and the resulting impact on strategy of both U.S. and foreign multinational corporations. Various aspects of strategy are considered, including marketing, production, and financial strategy. The focus of discussion is at the company level.
- 266 **International Marketing (3)** Robles, Riddle
Organizational structures. Analysis of international markets. Market-entry strategies and product policies. Special issues. Channels of distribution, promotional and price policies. Prerequisite: MBAd 240.
- 267 **Regional International Marketing Systems (3)** Robles
Discussion of the business, economic, political, legal, and social environments of Latin America, Asia, the Middle East, and China, as they affect the marketing of goods and services in these regions. Identification of business opportunities and risks in these areas.
- 268 **Global Marketing Strategy** Robles
Examination of the globalization process leading to the formation of global markets. Foundation for the development of a global vision and global marketing strategy. Recommended prerequisite: IBus 266.
- 269 **Managing in Developing Countries (3)** Staff
The course introduces managers to the distinctive nature and challenges of developing countries, provides a framework to analyze key management issues, and applies management techniques in these important markets.
- 271 **International Business Finance (3)** Park, Rehman, Weiner, Yang, Askari, Click
Analysis of major issues and developments in international business financial management and their impact on multinational corporations and financial institutions. Prerequisite: MBAd 250.
- 273 **Seminar: International Banking (3)** Park, Yang
International financial intermediation and international banking. Functioning of international financial markets, public policy issues in international banking, regulation of international banking institutions, and the effect of international banks on national monetary policies.

- 274 Global Investment Banking (3)** Park
Examination of investment banking as practiced in a global context from a strategic perspective using case studies and readings. Topics covered include securities underwriting and derivatives instruments, risk management, and business development strategies. Prerequisite: IBus 271.
- 275 External Development Financing (3)** Staff
Policies, institutions, instruments, and theory of external development financing; financial flows to developing countries; the role of international, regional, and national development banks; the World Bank and IMF; technical cooperation, institution building, training, and financial markets for developing countries.
- 276 Seminar: International Financial Markets (3)** Park, Askari, Weiner
Survey of international financial markets, focusing on structure and pricing. Primary emphasis on markets for foreign exchange, Eurocurrency, international bonds, and commodities. Derivatives markets, especially swaps and options. Prerequisite: IBus 271, MBAd 250.
- 277 International Portfolio Management (3)** Weiner
Theory and practice of international investment. Portfolio construction and optimization. Effects of exchange rate changes on portfolio risk and return. International asset pricing models and trading institutions. Prerequisite: MBAd 250; IBus 271.
- 278 International Business Negotiations (3)** Teegen
Theories and application in International Business Negotiations (IBN). Formulation of concepts and frameworks; development of systematic approaches to planning for and conducting IBN. Integration of functional, environmental, and institutional contexts facing negotiators internationally. Prerequisite: MBAd 240.
- 290 Special Topics (3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 298 Directed Readings and Research (3)** Staff
Supervised readings or research in selected fields within business administration. Admission by prior permission of instructor. May be repeated once for credit.
- 299 Thesis Seminar (3)** Staff
- 300 Thesis Research (3)** Staff
- 311 Seminar: Public-Private Sector Institutions and Relationships (3)** Staff
Same as SMPP 311.
- 361 Colloquium on International Business (3)** Staff
Examination of selected topics in international business, with emphasis on major new theoretical and empirical developments.
- 397 Doctoral Seminar (1 to 3)** Staff
- 398 Advanced Reading and Research (arr.)** Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to doctoral candidates. May be repeated for credit.

INTERNATIONAL DEVELOPMENT STUDIES

Program Committee: D. Gow (*Director*), E. Chacko, B. Dickson, S. Jain, B. Miller, S. Rehman, S.C. Smith, W.F. Waters, J. Williams

Master of Arts in the field of international development studies—The Elliott School of International Affairs offers a multidisciplinary program leading to the Master of Arts in the field of international development studies. The program provides students with a background both in international development and in a disciplinary concentration.

Prerequisite: the admission requirements stated under the Elliott School of International Affairs and a demonstrated interest in development.

Required: the general requirements stated under the Elliott School of International Affairs. The program offers a 34-credit-hour option with a thesis or a 40-credit-hour option without a thesis. Students qualify to write a thesis if they meet requirements stated under Thesis Option in the Elliott School section of this Bulletin. All students must take the

multidisciplinary development core, IAff 211-12, which serve as cornerstone and capstone courses, respectively.

Students select one disciplinary concentration from among the following: anthropology, economics, geography, international business, international education, international health, and political science. Students should consult the program guidelines available from the Elliott School for specific course work in the disciplinary concentrations. In consultation with the program director, students may also design their own concentration. There are no prerequisites for disciplinary concentrations, except for economics, which requires intermediate micro- and macroeconomics, an introductory course in econometrics, two courses in calculus, and two courses in statistics.

All students must demonstrate oral and reading proficiency in a modern foreign language. Students may apply up to 6 hours of language course credit toward the degree. Students must also complete a field in analytical skills, including one course in statistical analysis (chosen from PPol 211, PAd 296, or an equivalent), one course in economics (Econ 250 or 280), and one course in research methods relevant to the disciplinary concentration. Students are encouraged to take one course in management science.

INTERNATIONAL TRADE AND INVESTMENT POLICY

Program Committee: S. Suranovic (*Director*), W. Becker, M. Moore, J. Pelzman, S. Rehman, S. Sell, H. Wolf

The Elliott School of International Affairs offers a multidisciplinary program leading to the Master of Arts in the field of international trade and investment policy. The program provides a strong background in economics and quantitative methods, a multidisciplinary approach to international economics issues, and preparation for careers in government, the private sector, and nonprofit organizations.

Prerequisite: the admissions requirements stated under the Elliott School of International Affairs. Applicants are strongly advised to take an introductory statistics course and an intermediate microeconomics and macroeconomics sequence before beginning the program.

Required: the general requirements, stated under the Elliott School of International Affairs. The program offers a 34-credit-hour option with a thesis or a 40-credit-hour option without a thesis. Students qualify to write a thesis if they meet requirements stated under **Thesis Option in the Elliott School section of this Bulletin.**

The student must complete a core field consisting of Econ 283-84, PSc 239, a history course specified by the program director, and a quantitative methods course chosen from Econ 123; Mgt 207, 225; PPol 211; Stat 112, 118, 183. A four-course major field is selected from among the following: international economic analysis, international marketing, international banking and finance. The student should consult the program guidelines available from the Elliott School for the specific courses included in these major fields.

Oral and reading proficiency in a modern foreign language must be demonstrated during the final 18 hours in residence; up to 6 hours of language course credit may be counted toward the degree. The capstone course, offered each spring semester, must be successfully passed.

LATIN AMERICAN STUDIES

Program Committee: J. Ferrer (*Director*), C.J. Allen, A. Balkansky, P.F. Klarén, C. McClintock, M. Price, J. Quiroga

Master of Arts in the field of Latin American studies—The Elliott School of International Affairs offers a multidisciplinary program leading to the Master of Arts in the field of Latin American studies.

Prerequisite: the admission requirements stated under the Elliott School of International Affairs and a bachelor's degree in a related field. **Required:** the general requirements stated under the Elliott School of International Affairs.

The program consists of 40 credit hours of course work. The five-course core includes IAff 286, a multidisciplinary foundation course; IAff 287, the capstone course; and three courses on Latin America chosen from designated courses in anthropology, economics, geography, history, and political science. The four-course major field is taken in anthropology and geography; art history, literature, and culture; economics and international business; international health and development; or political science and history. Students should consult program guidelines available from the Elliott School for specific courses in the fields of study.

All students must demonstrate oral and reading proficiency in Spanish or Portuguese by passing a language examination during the final 18 hours in residence. Up to 6 hours of language course credit may count toward the degree.

Students who meet stated requirements may choose to take 34 hours of course work plus 6 hours of thesis research. See Thesis Option under the Elliott School section of this Bulletin.

LEGISLATIVE AFFAIRS

Academic Director C. Cushman

Columbian College of Arts and Sciences offers a program leading to the degree of Master of Arts in the field of legislative affairs. This program focuses on the U.S. Congress with emphasis on the legislative process, American political institutions, and public policy analysis.

Master of Arts in the field of legislative affairs—Prerequisite: a bachelor's degree with a B average from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences. The nonthesis program consists of 33 credit hours of course work; the thesis program consists of 27 hours of course work and 6 of thesis (PSc 299–300). PSc 201 or 203, 218, 222, and 229 are required. The remaining courses are chosen from the following, with at least two courses taken in each of the two groups.

American Political Process: PSc 215, 216, 219, 220, 221, 228, 246, 286; PMgt 267

Public Policy Analysis: PSc 212, 224, 249, 250; PMgt 266; WStu 240

With prior approval of the academic advisor, students may take up to three courses in related disciplines. All students must pass a Master's Comprehensive Examination.

MANAGEMENT SCIENCE

Professors J.B. Harvey, W.E. Halal, E.H. Forman, S.A. Umpleby, J.F. Lobuts, Jr., E.K. Winslow (Chair), J.H. Carson, P.W. Wirtz, E.J. Cherian, J.H. Perry, P.K. Bagchi, J.P. Coyne, R. Soyer, M.J. Granger, E. Jaques (Research)

Associate Professors T.J. Nagy, R.G. Donnelly, P.M. Swiercz, D.J. Cohen, W.H. Money, D.L. Zalkind, J. Artz, L. Williams, S.Y. Prasad, J. Bailey, M.M. Tarimcilar, E.G. Carayannis, P. McHugh, S. Kanungo

Assistant Professors C. Goldberg, J. Feinstein, F.T. Anbari, D.F. Cioffi, S. Dasgupta, Y.H. Kwak, R.A. Lumley, T.H. Rosen, S. Serich, P. Weiss, J.F. Sencindiver, M.C. Aniebonam, M.M. Hammad, V. Owei

Instructors E. Hahn, N. McGarry

Adjunct Associate Professors C.K. Carlson, C.N. Toftoy

Professorial Lecturers E. Marits, G.T. Solomon, J.L. Wild, D. Harris, D. Karlgaard

Associate Professorial Lecturers C.A. Gruel, J. Barker, J. Abramson, C.O. Bevis

See the School of Business and Public Management for programs of study leading to the degrees of Master of Business Administration, Master of Science in Information Systems Technology, Master of Science in Project Management, and Doctor of Philosophy.

201 Organization and Management (3)

Rosen, Money

Integrative approach to organizational concepts, management principles, philosophy, and theory in public and private organizations. Evolution of management, thought, functions, and practices, stressing present management approaches, general systems theory, and contingency management. For non-M.B.A. students only. (Fall, spring, and summer)

202 Mathematics and Statistics for Management (3)

Wirtz, Serich

Mathematical and statistical concepts employed in the solution of managerial problems. Applications of functions, elements of calculus, and linear algebra. Introduction to probability, frequency distributions, statistical inference, and regression and correlation. For non-M.B.A. students only. (Fall, spring, and summer)

206 Strategic Planning (3)

Halal

Formulation of strategies that enable organizations to adapt to changing social, technological, economic, and political conditions. Lectures, discussion, and exercises examine strategic planning practices and the environmental changes

- affecting corporations, government agencies, hospitals, and other major institutions. Students conduct a strategic planning project for an organization. (Fall)
- 207 **Applied Forecasting and Time-Series Analysis for Managers (3)** Soyer
Introduction to various forecasting techniques, including time-series regression models, cyclical trends, exponential smoothing methods, seasonal and nonseasonal ARIMA processes, and the Box-Jenkins approach. Application of forecasting methods in economics, finance, and marketing. Prerequisite: MBAd 220 or permission of instructor. (Spring)
- 210 **Individual and Group Dynamics in Organizations (3)** Harvey, Winslow, Lobuts, Bailey, Rosen
For graduate students who wish to improve their skills in dealing with human behavior in organizations. The course is designed to improve theoretical and personal understanding of the roles of interpersonal and group dynamics in management. Focus on individual and group behavior in various organizational settings. (Fall, spring, and summer)
- 211 **Current Issues in Organizational Behavior (3)** Winslow, Lobuts
Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems in organizational settings. Problems of conducting behavioral science research in organizations. (Fall)
- 212 **Behavioral Factors in the Process of Change (3)** Harvey, Winslow
Review of research, theory, and practice related to the process of human change. Students are provided the opportunity to apply their learning, using various media. This course emphasizes the relationship between theory and practice. (Fall, spring, and summer)
- 213 **Organization Development: The Process of Organizational Change (3)** Lobuts, Marits, Wild, Bailey
A review of the process and practices of organization development. An experiential course leading to the development of practitioner skills for the manager, leader, or organizational administrator. Emphasis is on systematic organizational interventions by the manager, although the roles of other change agents are explored. (Fall)
- 214 **Behavioral Factors in Management Consulting (3)** Harvey, Lobuts, Winslow, Bailey
Theories and methods of planning, introducing, and coping with change in management through the helping process. Intended both for managers seeking an understanding of the consultative approach to planned change and for persons in staff or consultative roles seeking understanding of the consultative process. (Spring)
- 215 **Conflict Management: Theory, Concepts, and Methods (3)** Lobuts, Harvey, Winslow, Bailey
Exploration of various approaches to the causes of conflict and its resolution. Students study and experience ways to make conflict a creative rather than a destructive experience. Methods of conflict resolution are practiced. Conflict is explored at the micro (person-to-person) and macro (system-to-system) levels. Prerequisite: Mgt 210 or permission of instructor. (Fall and spring)
- 216 **Cross-Cultural Management (3)** Lobuts, Umpleby, Winslow, Bailey
This course focuses on the variety of issues and opportunities that arise when managing outside one's own culture. The manager's credibility and effectiveness are assumed to be culture bound. Emphasis on the personal level as opposed to the interinstitutional or intercultural levels. Extensive use of student experiences and research. (Fall, spring, and summer)
- 220 **Analytical Models for Decision Making (3)** Soyer, Prasad, Tarimcilar
Survey of analytical models for decision making and their applications. Topics include probabilistic, deterministic, and sequential models, single- and multi-attribute utility theory, graphical models, Bayesian inference, forecasting, and concepts from game theory. Prerequisite: MBAd 220 and 231. (Fall and spring)
- 221 **Purchasing and Materials Management (3)** Bagchi
Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of require-

- ments, supplier qualifications, source selection, buying practices, policies, and ethics. International purchasing. (Fall and spring)
- 222 **Logistics Management** (3) Bagchi, Perry
Supply chain management in production, service, and public organizations. Analytical tools for planning and establishing operating systems and for their operation, control, and modification. Examination of processes, products, services, equipment, and facilities. Relationships of human systems and operating systems. (Fall)
- 223 **Manufacturing Control Systems** (3) Bagchi, Perry
Inventory and production control concepts, techniques, and strategies for effective integration with basic finance, marketing, and manufacturing objectives. Forecasting methods, material requirements planning systems, distribution requirements planning techniques, process control, and classical reorder-point inventory models. (Fall)
- 224 **Executive Decision Making** (3) Forman, Soyer, Williams, Tarimcilar
Concepts and methods for making complex decisions in both business and government; identifying criteria and alternatives, setting priorities, allocating resources, strategic planning, resolving conflict, and making group decisions. (Fall and spring)
- 225 **Statistical Modeling and Analysis** (3) Wirtz, Forman, Soyer
The process of specifying, analyzing, and testing models of human and systemic behavior. Formalization of models; statistical test comparison and selection; computer implementation of univariate, bivariate, and multivariate tests. General linear model: linear regression, analysis of variance, and analysis of covariance. Prerequisite: MBAd 220 or equivalent. (Fall and spring)
- 226 **Workshop in Computerized Decision Systems** (3) Tarimcilar, Prasad, Zalkind, Williams
Framework, processes, and technical components for building decision support systems dealing with unstructured and underspecified problems from managerial and organizational perspectives. Construction and exploration of decision support system models. Prerequisite: Mgt 220 or permission of instructor. (Fall and spring)
- 227 **Advanced Logistics** (3) Bagchi
Modeling approaches in supply chain management; optimization of cost and service. Alternatives available to the manager, given the economic situation, competitive conditions, and regulatory environment of the several transportation modes. Model location theory and logistics network planning and design. Prerequisite: Mgt 222. (Spring)
- 228 **Operations Strategy** (3) Bagchi, Perry
Basic procurement and logistics methods and techniques that influence formulation of a firm's strategic policy. Traditional and updated and improved systems for controlling capacity and output. Examination of productivity analysis, cost control, materials planning, and other topics to ensure that the strategy formulation/operations function contributes to overall profit. (Spring)
- 229 **Seminar: Management Decision Making** (3) Forman, Soyer, Prasad, Tarimcilar
Advanced topics in management decision making. Topics vary but usually include Bayesian statistics and decision analysis, graphical models, strategic decision making, and business applications of game theory. Prerequisite: Mgt 220, 224, or permission of instructor. (Spring)
- 230 **Management of Technology Innovation** (3) Donnelly
Competitive, economic, and political factors that influence technology innovation in public and private organizations, domestically and internationally. Management of research and development: project selection, resource allocation, technology planning, management of development projects. Quality, manufacturing, and intellectual property issues. (Fall and spring)
- 231 **Project Management** (3) Williams
Practical examination of how projects can be managed from start to finish, including specific emphasis on planning and controlling to avoid common pitfalls. Identifying needs, defining requirements, project costing, scheduling, resource allocation, and project politics. Configuration management; micro-computer applications. (Fall, spring, and summer)

- 232 **International Science and Technology (3)** Caravannis
Technology transfer among advanced countries and LDCs. Comparative science and technology policies and capabilities of countries. Technology basis for international trade, licensing, patenting, and joint ventures. Global transfer of military technologies and export controls. Technology in economic development. (Fall, spring, and summer)
- 233 **Emerging Technologies (3)** Halal
Exploration of new developments in scientific and technological innovation, including automation, energy, medicine, bioengineering, social science, information technology, and space. Emphasis on forecasting these technological advances and assessing their economic and social effects. The role of advancing technology in driving social change. (Spring)
- 234 **Procurement and Contracting (3)** Staff
Principles and concepts essential to effecting large procurement programs. Planning, sourcing, and contractual design for diverse acquisitions. Emphasis on federal government policy with comparison of buying at other governmental levels and the private sector. (Spring)
- 235 **Technology Entrepreneurship and Innovation (3)** Donnelly
The process of innovation and entrepreneurship used to launch and build new ventures. Organizing for innovation, raising venture capital, tax considerations, managing the small technology-based venture, marketing technology. Case studies of recent low- to high-tech ventures. Developing a business plan for a technology-based venture. (Spring and summer)
- 236 **Government Contract Administration (3)** Staff
Surveillance and management of contract performance. Measurement of progress; specification interpretation; quality assurance; changes, negotiation, and adjustment; financial considerations; property; terminations; regulatory and policy concerns. (Spring)
- 237 **Pricing and Negotiation (3)** Staff
Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. (Fall)
- 238 **Systems Procurement and Project Management (3)** Staff
Major systems acquisition: needs, objectives, organizational relationships, and systems engineering concepts. Design, establishment, and execution of project management plans and procurement processes. Analysis of cases in public- and private-sector contracting. (Fall)
- 239 **Seminar: Competitiveness and Technology (3)** Donnelly
Capstone course integrating the field of management of science, technology, and innovation. Commercialization of technology in the private sector and the impact on competitiveness. Implementation of technology in the public sector. Technology development, from new product concept to utilization.
- 240 **Case Studies in Information Systems (3)** Artz
Case studies dealing with information systems management and technology. Strategic and management-related issues on information systems development, implementation, and application. Prerequisite: MBAd 221. (Fall and spring)
- 241 **Information Security Systems (3)** Cherian
An advanced course in information technology, emphasizing the philosophies, principles, and practices of security management in and impact of privacy legislation on computer-based systems. Risk assessment, state-of-the-art measures, trends in the information security field, and roles of the various levels of management and technological staff. Prerequisite: M.S.I.S.T. candidacy.
- 242 **Systems Analysis for Information Systems (3)** Carson, Artz, Gruel
Development of a specification for an information system. Topics include CASE tools, data gathering, information flow modeling, object-oriented analysis, data file organization, input/output and other nonfunctional requirements, such as performance reliability, environmental conditions, and training. (Fall and spring)
- 243 **Human Factors in Information Systems (3)** Nagy
The user-computer interaction, human factors of on-line dialogues, interfacing, and various approaches to user-system interaction. Emphasis on the development and evaluation of user-computer interfaces using software such as Visual BASIC and Windows. (Fall and spring)

- 244 **Telecommunications: Technology, Applications, and Operations** (3) Carson, Artz, Feinstein
Basic technical concepts, applications, and trends of telecommunications; operations; cost considerations of implementing telecommunications systems. (Spring)
- 245 **Database Management for Information Systems** (3) Artz, Dasgupta, Feinstein
Theory, architecture, and implementation of database management systems in corporate and organization information systems. Designing databases for business applications and implementing such databases using commercially available packages. (Fall and spring)
- 249 **Seminar in Hypermedia Information Systems** (3) Coyne
Current trends in the design and implementation of hypermedia information systems. Integration of database, text, image, voice, video, and knowledge in information systems. (Fall and spring)
- 250 **Human Resource Management** (3) Cohen, Swiercz, Goldberg
Human resource practices in a competitive U.S. economy and in an internationally competitive environment, including labor-management relations. (Fall, spring, and summer)
- 251 **Total Compensation** (3) McHugh
Comprehensive review of all elements of adaptive compensation systems that affect an organization, including wages and salaries, incentives, benefits, perquisites, and intrinsic rewards. (Fall)
- 252 **Global Human Resource Management** (3) Cohen
International applications of human resource management functions. Selection, preparation, and compensation of U.S. managers and executives for service abroad. Adaptation of human resource management policies to conform to specific cultural environments. (Fall and summer)
- 253 **Leadership and Executive Development** (3) Cohen
Theories of managerial leadership; issues and problems associated with leadership in large organizations at higher management levels: executive selection and development. (Fall)
- 254 **Labor-Management Relations and Negotiations** (3) McHugh, Swiercz
Labor-management relations in both union and nonunion settings. Emphasis on negotiation and conflict resolution, arbitration and grievance procedures, public-sector labor relations, labor laws and public policy, and global labor relations issues. (Fall)
- 257 **Performance Management and Development** (3) Cohen
Comprehensive review of performance appraisal and training and development. Students learn to develop customized training programs that relate to the performance appraisal process. (Spring)
- 258 **Applied Organizational Leadership** (3) Malone
In-depth studies of theories of leadership. Legal and ethical obligations of leadership. The leader in the process of assuming responsibility. Experiential exercises designed to develop the students' interpersonal abilities and leadership capacities. (Spring)
- 259 **Employment Law and Ethics** (3) Swiercz, McHugh
An examination of the interaction of legal requirements and personal ethics and their influence on managerial decisions affecting the employment exchange. Special emphasis on equal employment opportunity and civil rights, workers' compensation, occupational health and safety, collective bargaining, and wrongful discharge. (Fall)
- 264 **System Dynamics Modeling** (3) Umpleby, Kanungo
Computer modeling of organizational problems using system dynamics and the dynamo programming language. Review of previous applications of system dynamics and comparison with other modeling approaches. Causal influence diagrams, level and rate diagrams, equations, testing, and analysis. Students develop a system dynamics model of some aspect of the organization. (Fall)
- 265 **International Development for Project Managers** (3) Carayannis
Foundations and methodologies for problem solving in multicultural project environments. Prerequisite: Mgt 201, 202, 224. (Fall, spring, and summer)
- 266 **Risk Management** (3) Kwak
Methodologies used in the identification, quantification, and mitigation of project risks. Prerequisite: Mgt 201, 202, 224. (Fall, spring, and summer)

- 267 **Planning and Scheduling (3)** Staff
Examination of various techniques in managing budgets, schedules, and human/material resource allocations, including estimating costs, duration, resource requirements; charting techniques; life-cycle cost estimating; integrated cost/schedule control; configuration management; requirements generating and analysis tools. Prerequisite: Accy 201, Mgt 202. (Fall, spring, and summer)
- 268 **Project Management Capstone (3)** Staff
Students will be expected to demonstrate integration of the knowledge accumulated in their study plan and apply integrated knowledge and experience to several project case histories in the process of evaluating and analyzing the details of each project. Prerequisite: M.S.P.M. candidacy or permission of instructor. (Fall, spring and summer)
- 269 **Project Estimating and Cost Management (3)** Anbari
Formalized procedures, tools, and techniques used in developing the project estimate during the planning stages and updating the estimate throughout the project life-cycle; tools and techniques used in monitoring, managing, and controlling the cost of the project. Prerequisite: M.S.P.M. candidacy and Mgt 270. (Fall and spring)
- 270 **Directed Computational Project Management (2)** Cioffi
Software intensive course based on computational aspects of project management. Prerequisite: Mgt 231.
- 271 **Principles of Management Information Systems (3)** Cherian, Money
Integration of management, information, and systems concepts into a unified framework. Management information systems development, design, implementation and evaluation strategies. Prerequisite: M.S.I.S.T. candidacy.
- 272 **Information Resources Management (3)** Cherian, Williams
An overview of the use of information by organizations and the strategies, policies, and technology used to manage information resources and security. Computer networking and national and international telecommunications are examined within the technical, legal, economic, and social environments of systems operations. Prerequisite: M.S.I.S.T. candidacy.
- 273 **Electronic Business (3)** Cherian, Weiss
Overview of electronic commerce/electronic business and interorganizational information systems and their impact on contemporary organizations. Technical, business, security, privacy, legal, and Internet issues. Prerequisite: Mgt 271 or 282 or MBAd 221. (Fall, spring, and summer)
- 275 **Advanced Statistical Modeling and Analysis (3)** Wirtz
Advanced topics associated with the general linear model. Testing for and remediation of assumption violations. Detection of outliers, influential observations, and multicollinearity. Alternative design strategies in the analysis of variance; latent growth analysis; hierarchical linear modeling; testing for interactions and parallelism. Prerequisite: Mgt 225 or permission of instructor.
- 276 **Exploratory and Multivariate Data Analysis (3)** Wirtz
Methods for exploratory and multivariate data analysis. Application and comparison of advanced multivariate analytical procedures. Multivariate and discriminant analysis, LISREL analysis, and canonical correlation. Prerequisite: Mgt 225 or permission of instructor. (Fall)
- 277 **Human-Computer Interface Design and Evaluation (3)** Nagy
The development of successful human-computer interfaces depends on integrating theory and practice from many different fields. Students gain direct experience in applying an apt mix of concepts and practices in the context of developing, evaluating, and enhancing an Internet application for a real client. (Fall, spring, and summer)
- 278 **Knowledge Acquisition (3)** Nagy
Knowledge acquisition is often the biggest problem in expert systems development. The ability to acquire knowledge from the expert requires both technical and interpersonal skills. This course is aimed at explaining some of the barriers to acquiring knowledge and discusses techniques to overcome them.
- 279 **Special Topics in Neural Networks (3)** Coyne, Nagy, Artz, Feinstein
This course covers the fundamental concepts of neural networks and the use of this technology for a variety of business applications. Students develop

neural network applications using commercial neural network software. The relationship between neural networks and expert systems. Prerequisite: permission of instructor.

- 280 Information Systems Development and Applications (3)** Artz, Carson
Each stage of the information systems life cycle is discussed in terms of technologies, impact, and management. Topics include structured and object-oriented analysis, prototyping, software reuse, testing, life-cycle costs, software development environments, organizational and behavioral aspects of development projects. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 281 Virtual Reality for Business Applications (3)** Coyne
Introduction to virtual reality and 3-D data visualization, with emphasis on business applications. Fundamental concepts, equipment, and capabilities, and the use of VR as an integrative mechanism for other intelligent technologies.
- 282 Telecommunication and Enterprise Networks (3)** Carson, Artz, Prasad, Feinstein
Telecommunications and networking as applied to enterprises in the commercial and public sector. A survey of the technologies and applications of telecommunications systems with emphasis on LANs and Internet technologies. Selection of technologies and configurations necessary to support business applications. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 283 Topics in Higher-Level Languages (3)** Carson, Artz
The structure and organization of high-level languages in relation to the systems development process. Object-oriented design and programming using the JAVA programming language. Programming assignments demonstrate the concepts presented. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 284 Database Systems (3)** Coyne, Feinstein
Use of the latest techniques for developing and implementing an effective database system. Topics include database organization, creation, and maintenance; evaluation criteria; standardization of database systems; and analysis of the state of the art in database development. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 285 Database and Intelligent Systems (3)** Coyne, Feinstein
Analysis and solution of complex information problems through commercially available database and intelligent systems; development of evaluation methodology, comparison of implementation strategies. Hands-on experience with major commercial systems. Prerequisite: M.S.I.S.T. candidacy; Mgt 284 or department approval.
- 286 Comparative Operating Systems (3)** Artz, Carson
Survey of modern operating systems including Unix, Windows NT, and MVS. Process management, memory management, storage management, scheduling, and security are considered theoretically and as implemented in specific operating systems. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 287 Design of On-Line Information Systems (3)** Carson, Money
Capstone project course. Analysis, design, and implementation of on-line information systems. Systems analysis, database design, dialog design, response time and reliability calculations, system testing, and project planning. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 288 Artificial Intelligence and Intelligent Systems (3)** Nagy, Feinstein
Use of programming methods and knowledge representations originating in artificial intelligence (e.g., executable specifications, rules, frames, objects, neural networks) to develop systems. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 289 Web-Based Systems Development (3)** Artz, Lumley
The conceptualization, design, and development of business applications using the World Wide Web and emerging technologies. Prerequisite: M.S.I.S.T. candidacy or department approval.
- 290 Special Topics (2 or 3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 291 Entrepreneurship (3)** Winslow, Solomon
In exploring the "entrepreneur as a phenomenon," students will be exposed to the theory and experiences associated with entrepreneurs, entrepreneurial acts.

- and entrepreneurship in all organizational settings—large, small, public, and private. (Fall and spring)
- 292 **Small-Business Management** (3) Toftoy, Winslow
The start-up process and management of small firms. Field projects involve student teams as consultants to local businesses. Case studies. Emphasis on total customer service, international opportunities, and minority and women's issues.
- 293 **New Venture Initiation** (3) Toftoy, Carayannis
Essentials of planning a new business venture, sources of financing, evaluation of alternative new business ventures, and analysis of business functions. Creating and analyzing the business plan.
- 294 **Strategic Entrepreneurship** (3) Toftoy, Winslow
Capstone course for the small business/entrepreneurship concentration. Student teams assist companies in upgrading strategies.
- 298 **Directed Readings and Research** (3) Staff
- 299 **Thesis Seminar** (3) Staff
- 300 **Thesis Research** (3) Staff
- 311 **Seminar: Public-Private Sector Institutions and Relationships** (3) Staff
Same as SMPP 311.
- 328 **Special Topics in Decision Making** (3) Staff
Special topics and advanced applications, such as catastrophe theory, Markovian decision processes, and Bayesian statistics. May be repeated once for credit.
- 329 **Seminar: Logistics and Operations Management** (3) Bagchi, Perry
Recent developments in production and logistics management; impact of technological economic and social change; significant related trends. Private- and public-sector policy implications. New and emerging analysis techniques. Open only to doctoral students.
- 340 **Philosophical Issues in Information Systems** (3) Artz
Seminar for doctoral students interested in information systems. Various philosophical traditions and insights from those traditions applied to problems in information systems. (Fall, alternate years)
- 341 **Advanced Topics in MIS Research** (3) Prasad
For information systems doctoral students. Seminal IS papers and leading methods and instruments as applied to MIS research. (Spring, alternate years)
- 382 **Seminar: Historical Foundations of Organizational Behavior and Development** (3) Harvey, Lobuts, Winslow
The individuals and institutions central to the field of organizational behavior and development. Students read about, meet with, and discuss the work of persons central to the development of the field. Prerequisite: Doctoral candidate status with organizational behavior and development as a major or supporting field, or consent of instructor. (Spring, alternate years)
- 383 **Field Research in Organizational Settings** (3) Langton
Applications of field research techniques in formal organizational settings. Examination of the logic of inquiry and techniques of qualitative data collection. Intensive interviewing and participant observation in field settings are emphasized. (Fall)
- 385 **Special Topics in Research Methods** (3) Wirtz
Research problems and issues related to student dissertations form topics for readings, group discussions, and assigned papers. (Fall and spring)
- 386 **Seminar: Organizational Behavior and Development Ideas in Progress** (3) Harvey, Lobuts, Winslow
Doctoral students work with a variety of faculty members as they develop new ideas, research projects, and engage in seminal inquiry. The content and structure of the course will depend upon the instructor. Prerequisite: Doctoral candidate status with organizational behavior and development as a major or supporting field, or consent of instructor.
- 390 **Philosophical Foundations of Administrative Research** (3) Staff
Philosophy of science as applied to research in administration. Topics include the nature and current problems of epistemology, the development and role of theories, and the relationship between theory, methodology, and empirical data. (Fall and spring)
- 391 **Advanced Problems in Research Methodology** (3) Wirtz, Marits
Use of models and theoretical frameworks in research; formulation of research questions, hypotheses, operational definitions, research designs, sampling and

data analysis approaches. For doctoral candidates who have completed the general examination and all courses and are preparing for their dissertation. (Fall and spring)

- 397 **Doctoral Seminar (1 to 3)** Staff
Current research and scholarly issues in management science.
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to doctoral candidates. May be repeated for credit.

MARKETING

Professors S.F. Divita (Chair), R.F. Dyer, P.A. Rau, R.S. Achrol, L.M. Maddox
Associate Professors M.L. Liebrez-Himes, S.S. Hassan
Assistant Professor A.K. Smith

See the School of Business and Public Management for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

Departmental prerequisite: MBAd 230 is prerequisite for all courses in the Marketing Department.

- 241 **Advanced Marketing Management (3)** Rau
For M.B.A. students in concentrations other than marketing. Case analysis of marketing problems. Current developments in marketing practice. The relationship of marketing to environmental forces and other business functions. (Spring)
- 242 **Buyer Behavior (3)** Dyer, Hassan, Maddox
A required course for marketing students. The buyer decision process model as a framework for analysis of how and why products and services are purchased and used. The impact of consumer decisions on the marketing strategies of organizations. Marketing applications in high-tech and service industries. (Fall)
- 243 **Marketing Research (3)** Dyer, Rau
The marketing research process: designing, conducting, and using market research studies. Managing the market research project; qualitative research; survey and experimental designs; data analysis with statistical software packages. Prerequisite: MBAd 220 and 221. (Fall and summer)
- 246 **Marketing of Services (3)** Liebrez-Himes, Smith
Management of the activities involved in marketing new and existing services. The innovation system (behavioral and organizational) of service product decisions, product planning processes, marketing auditing, services and the law, and new service trends. Marketing of intangibles and services is highlighted. (Spring)
- 248 **Advertising and Sales Promotion (3)** Maddox
Examination of advertising and sales promotion from a systems perspective supported by analytical methods and concepts regarding consumer attitudes and behavior. The role of communication in marketing, behavioral research, message design, economic and financial criteria, development of a promotion program. (Spring)
- 250 **Selling and Sales Management (3)** Divita
The selling task, with attention to ethical and legal issues, the selling process, account management, negotiation. Managerial issues, demand analysis and resource allocation, financial planning, quota setting and control, motivation, coaching and incentives, sales administration, and analysis of sales performance. (Fall and spring)
- 253 **Marketing Channels of Distribution (3)** Achrol
Designing and managing channels of distribution. Retailing and wholesaling strategy. Electronic marketing channels: e-Business models and execution. Design of integrated inventory, physical distribution, and logistics systems. Managing channel relations and measuring performance. Regulatory issues in conventional and electronic channels. Global networks. (Fall)

- 255 **Marketing High Technology (3)** Divita
Emphasis on differentiating the marketing process used for marketing high technology and high technology products from that employed by firms offering a standard product line. Market analysis, product planning, channels of distribution, pricing, promotion, decision making, and developing an integrated marketing plan. Primarily for M.S.I.S.T. students.
- 257 **Marketing and Public Policy (3)** Divita
Examination of principal areas of public policy formulation affecting marketing practice. Topics: advertising, warranties, product safety, health issues, consumer information systems, informal and formal redress mechanisms, business responsibilities. Government, business, and advocate viewpoints presented. Permission of instructor may waive the departmental prerequisite.
- 259 **Marketing Strategy (3)** Divita, Rau
Required capstone course for marketing students. Analysis of complex marketing problems involving policy and operational decisions; emphasis on creative marketing strategy. Prerequisite: completion of at least three Second-Level marketing courses, excluding Mktg 241. (Spring)
- 290 **Special Topics (3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 298 **Directed Readings and Research (3)** Staff
- 299 **Thesis Seminar (3)** Staff
- 300 **Thesis Research (3)** Staff
- 311 **Seminar: Public-Private Sector Institutions and Relationships (3)** Staff
Same as SMPP 311.
- 341 **Seminar: Marketing (3)** Achrol, Dyer, Liebrez-Himes, Rau, Hassan
Examination of major theoretical developments in marketing. Open only to doctoral candidates.
- 397 **Doctoral Seminar (1 to 3)** Staff
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to doctoral candidates. May be repeated for credit.

MASTER OF BUSINESS ADMINISTRATION

The following courses constitute core and integrative requirements for graduate programs in accountancy and business administration. See the School of Business and Public Management for programs of study leading to the degrees of Master of Accountancy and Master of Business Administration. MBAd courses are taught by faculty members school-wide.

- 201 **Global Leadership of Business Enterprise (0 to 2)** Staff
A series of required co-curricular workshops, seminars, company site visits, and speaker series. Topics include management communication, team-building and self-assessment, business ethics, cross-cultural communication, career development. Open to full-time M.B.A. students.
- 205 **Human Dynamics in Organizations (2)** Swiercz, Cohen, Bailey
Integrative approach to organizational concepts, management principles, and the effects of leadership styles and human resource policies and practices on organizational performance in a global and competitive work environment.
- 210 **Financial Accounting (2)** Singleton, Sheldon, Smith
Same as Accy 201.
- 211 **Managerial Accounting (2)** Lindahl, Paik, Baber
Cost information in managerial decisions and operations of the firm. Cost data collection and analysis. Cost accumulation process. Techniques for using cost data in decision making, planning, control, and performance evaluation and in financial reporting and performance evaluation by others. Same as Accy 202. Prerequisite: MBAd 210.
- 220 **Statistical Analysis for Managers (2)** Soyer, Wirtz, Forman, Zalkind, Tarimcilar, Kanungo
Statistical concepts employed in the solution of managerial problems. Descriptive statistics, frequency distributions, probability, sampling distributions, sta-

- tistical inference and testing, correlation analysis, regression modeling, analysis of variance. Introduction to forecasting and statistical process control. Statistical software is used for applications.
- 221 Information Systems Technology (2)** Artz, Prasad, Dasgupta
Management information systems, databases and database management, telecommunications, and enterprise networks. Emerging technologies, including neural networks, multimedia, virtual reality, and videoconferencing. Functional information systems, systems life cycle, knowledge-based systems, computer security and control, and information resource management
- 230 Marketing Management (2)** Dyer, Divita, Liebrez-Himes, Hassan, Maddox, Rau, Achrol, Smith
Emphasis on the marketing process from the viewpoint of the firm. Market analysis, product planning, channels of distribution, pricing, and promotional decision making; developing an integrated marketing plan.
- 231 Operations Management (2)** Forman, Perry, Bagchi, Soyer, Zalkind, Tarimcilar, Kanungo
Fundamentals of operations management and strategic and tactical decision making. Inventory management, resource allocation, production planning, project management, location and transportation analysis, investment planning, queuing systems, equipment selection and maintenance. Prerequisite: MBAd 220.
- 240 The World Economy (2)** Askari, Park, Rehman, Yang, Teegen
Key dimensions of the global economy, including international business opportunities and risks. Trade theory and policy, the balance of payments, foreign exchange markets, exchange rate systems and risks, and international payment systems. Foreign direct investments. The changing role of multinational corporations; elements of international corporate strategies. Prerequisite: Econ 220.
- 250 Financial Management (2)** Klock, Jabbour, Handorf, Eppli
Theory, policy, and practice in financial management; financial analysis, sources of funds, investing, capital budgeting and structure, risk analysis, cost of capital, and dividend policy. Prerequisite: Econ 220; MBAd 210, 220.
- 260 Business and Public Policy (2)** Carruth, Englander, Starik, Burke, Griffin, Prakash
Political, legal, economic, and ethical forces acting on business. Interaction of the market system and public policy process in the development of law and regulation.
- 270 Strategy Formulation and Implementation (3)** Davis, Thurman, Cook, Starik, Teng, Burke
An integrative approach to strategic management, stressing formulation, implementation of strategy and policy, and evaluation and control of strategy in various types of organizations. An intramural case competition is required. Prerequisite: Full-time M.B.A. degree candidacy and completion of all other M.B.A. core requirements.
- 271 Strategic Management (2)** Davis, Thurman, Cook, Starik, Teng, Burke
An integrative approach to strategic management, stressing formulation, implementation of strategy and policy, and evaluation and control of strategy in various types of organizations. Prerequisite: Professional M.B.A. degree candidacy and completion of all other core requirements.
- 295 Interdisciplinary Projects (1 to 4)** Staff
Project and experiential studies of an interdisciplinary nature involving student teams and faculty from more than one field of study. May be repeated for credit. M.B.A. Program Director approval is required.

MATHEMATICS

Professors I. Katz, H.D. Junghenn, L.I. Glick, M.M. Gupta, E.A. Robinson, F.E. Baginski, D.H. Ullman (Chair), J. Przytycki
Associate Professors V. Harizanov, K.G. Hockett, M. Moses, J. Bonin, Y. Rong, W. Schmitt
Assistant Professors D. Ivansic, L. Abrams, S. Faridi, L. Kalikow

Master of Arts in the field of mathematics—Prerequisite: a bachelor's degree with a major in mathematics from this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences. Students must complete 30 credit hours of approved course work in mathematics, with no more than 6 hours of approved 100-level courses, and must pass a comprehensive examination in three subjects selected from algebra, analysis, topology, differential equations, numerical analysis, and linear algebra/advanced calculus.

Master of Arts or Master of Science in the field of applied mathematics—Prerequisite: a bachelor's degree with a major in mathematics or a related field such as statistics, a physical science, engineering, or economics.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work is divided between mathematics courses and approved courses from one area of application selected from physics, statistics, computer science, economics, or civil, electrical, mechanical, or systems engineering. Candidates must complete 30 credit hours of approved course work. At least 18 credit hours must be in mathematics courses, with no more than 6 hours of approved 100-level courses. A comprehensive examination must be passed in three subjects selected from algebra, analysis, topology, differential equations, numerical analysis, and linear algebra/advanced calculus.

Doctor of Philosophy in the field of mathematics—Required: the general requirements stated under Columbian College of Arts and Sciences. The General Examination consists of a preliminary examination in three subjects selected from algebra, analysis, topology, differential equations, numerical analysis, and linear algebra/advanced calculus, and a specialty examination in a research area approved by the department. A language examination to demonstrate reading knowledge of mathematics in an approved foreign language is also required.

With permission, the following undergraduate courses in the department may be taken for graduate credit (additional course work is required): Math 101, 102, 103, 113, 132, 148, 181. See the Undergraduate Programs Bulletin for course listings.

201-2 Algebra I-II (3-3)

Abrams, Katz

Group theory including symmetric groups, free abelian groups, finitely generated abelian groups, Sylow theorems, solvable groups. Factorization in commutative rings, rings of polynomials, chain conditions, semisimple rings, Wedderburn-Artin theorems, Galois theory.

203 Algebra III (3)

Abrams, Katz

An extension of the material of Math 201-2, including Frobenius' theorem on associative division algebras, the Hurwitz problem on composition of forms, valuation theory, formally real fields, rings without finiteness conditions, elements of homological algebra with applications.

206 Topics in Algebra (3)

Abrams, Katz

Topics chosen from Lie groups and Lie algebras, non-associative algebras, abelian groups, classical groups, algebraic number theory, representation theory, algebraic geometry, and ring theory. Prerequisite: Math 201-2. May be repeated for credit with permission.

211 Complex Analysis (3)

Junghenn

Topology of the complex plane; complex differentiation and integration; Cauchy's theorem and its consequences; Taylor and Laurent series; classification of singularities; residue theory; conformal mapping; the Riemann mapping theorem. Prerequisite: Math 139 or equivalent.

214 Measure and Integration Theory (3)

Glick

Lebesgue measure and integration in abstract spaces. Probability measures. Absolute continuity, the Radon-Nikodym theorem, measures on product spaces, and the Fubini theorem. L^p spaces and their properties. Prerequisite: Math 139 or equivalent.

215 Introduction to Functional Analysis (3)

Robinson

Topological and metric spaces; Tychonoff theorem; Banach spaces; linear functionals and operators; Hahn-Banach, closed graph, and open-mapping theorems; uniform boundedness; Hilbert spaces; eigenvalues, projections. Prerequisite: Math 214 or equivalent.

216 Topics in Real and Functional Analysis (3)

Junghenn

Possible topics include Banach algebras, function algebras, spectral theory for bounded and unbounded operators, harmonic analysis on topological groups and semigroups, topological vector spaces and operator algebras. Prerequisite: permission of instructor. May be repeated for credit with permission.

- 217 Ordinary Differential Equations (3)** Glick, Hockett
Existence and uniqueness of solutions, continuity and differentiability of solutions with respect to initial conditions. Properties of linear systems, phase portraits, planar systems and Poincaré-Bendixson theory. Prerequisite: Math 140 and some knowledge of matrix theory.
- 219 Partial Differential Equations (3)** Baginski
Classical techniques for the solution of linear partial differential equations. Laplace's equation, Poisson's equation, heat equation, and wave equation. Existence and uniqueness of solutions. Maximum principles. Separation of variables, Fourier series, eigenfunction expansions, and Green's functions. Prerequisite: Math 140 or permission of instructor.
- 221 Modern Partial Differential Equations (3)** Baginski
Emphasis on modern theory and analytical techniques applied to the solution of partial differential equations. Topics include Sobolev spaces, generalized solutions, strong solutions and regularity; Sobolev imbedding theorem; Rellich-Kondrachov theorem; Leray-Schauder fixed-point theorems; nonlinear eigenvalue problems. Prerequisite: Math 219 or permission of instructor.
- 222 Introduction to Numerical Analysis (3)** Gupta
Computer arithmetic and round-off errors. Solution of linear and nonlinear systems. Interpolation and approximations. Numerical differentiation and integration. Eigenvalues and eigenvectors. Prerequisite: Math 33 and knowledge of a programming language.
- 223 Numerical Solution of Ordinary and Partial Differential Equations (3)** Gupta
Initial and boundary value problems for ordinary differential equations. Error propagation, convergence and stability. Finite difference and finite element methods for partial differential equations. Prerequisite: Math 111 and knowledge of a programming language.
- 225 Ergodic Theory (3)** Robinson
Ergodicity, mixing, the K-property and the Bernoulli property. Poincaré recurrence, the Rohlin lemma, the ergodic theorem, and entropy theory. Additional topics from isomorphism theory, spectral theory, the theory of joinings, and coding theory. Prerequisite: Math 214 or permission of instructor.
- 226 Dynamical Systems and Chaos (3)** Hockett
Linear and nonlinear systems, flows, Poincaré maps, structural stability. Examples of chaotic systems in the physical sciences. Local bifurcations, center manifold theory, normal forms, the averaging theorem. Hyperbolic invariant sets, strange attractors, the Smale horseshoe, symbolic dynamics. Prerequisite: Math 124 and 140 or permission of instructor.
- 231 Topics in Applied Mathematics (3)** Baginski, Glick
Possible topics include, but are not limited to, the calculus of variations, control theory, nonlinear partial differential equations, and mathematical programming. May be repeated for credit with permission.
- 232 Topics in Numerical Analysis (3)** Gupta
Numerical methods and software. Introductions to the methods, tools, and ideas of numerical computation. Problem solving using standard mathematical software obtained from the Internet. Interpolation; linear and nonlinear equations. Differential equations. Prerequisite: Math 111 and 124; knowledge of a programming language.
- 234 Multigrid Methods and Parallel Computation (3)** Gupta
Multigrid and multilevel techniques for solving partial differential equations. Numerical solution of partial differential equations; basic iterative techniques; multilevel preconditioners; parallel computation; domain decomposition methods; algorithm development; software packages. Prerequisite: Math 124 and 153; knowledge of a programming language.
- 244 Computational Methods for Partial Differential Equations (3)** Baginski
Computational methods for the solution of partial differential equations, including variational formulations and the finite element method. Prerequisite: Math 124 and knowledge of a programming language, or permission of instructor.
- 261 Combinatorics (3)** Bonin, Ullman
An introduction to fundamental methods and current research problems in partially ordered sets, enumeration, tableaux, partitions. Prerequisite: undergraduate modern algebra and linear algebra or permission of instructor.

- 262 **Graph Theory (3)** Bonin, Ullman
Graphical enumeration, factors, planarity and graph coloring, algebraic graph theory, extremal graph theory, applications. Prerequisite: undergraduate modern algebra and linear algebra or permission of instructor.
- 263 **Topics in Combinatorial Mathematics (3)** Bonin, Ullman, Schmitt
Topics selected from a wide range of research subjects in combinatorics, its relations with other areas of mathematics, and applications. Recent selections have included matroid theory, topological methods in ordered sets, algebraic methods in combinatorics, fractional graph theory, combinatorics of polytopes, the symmetric group. May be repeated for credit with permission.
- 271 **Mathematical Logic (3)** Harizanov, Moses
Model theory: the relation between a formal language (syntax) and its interpretations (semantics). Consistency, completeness, and compactness. Tarski's theorem on the inexpressibility of truth. Godel's incompleteness theorem and its impact on mathematics.
- 272 **Topics in Logic (3)** Harizanov, Moses
Topics selected from a broad spectrum of areas of logic and applications, based on students' suggestions and interests. May be repeated for credit with permission.
- 274 **Computational Complexity (3)** Harizanov, Moses
Computability versus complexity; undecidable versus intractable problems; determinism versus nondeterminism; time and space complexity measures and their relations; the P versus NP questions; NP-complete problems; logarithmic space classes; exponential space complete problems; axiomatic complexity theory; probabilistic algorithms. Prerequisite: Math 32 or permission of the instructor.
- 281 **General Topology (3)** Rong, Przytycki
Topological spaces, bases, open sets and closed sets; continuous maps and homeomorphisms; connectedness and compactness; metric topology, product topology and quotient topology; separation axioms; covering spaces and fundamental groups.
- 282 **Algebraic Topology (3)** Rong, Przytycki
Fundamental groups and the Van Kampen theorem; simplicial complexes, simplicial homology, and Euler characteristic; singular homology, Mayer-Vietoris sequences. Topics may include cohomology, cup products, and Poincaré duality; classification of surfaces; knots and their fundamental groups. Prerequisite: Math 281 or permission of instructor.
- 289 **Topics in Topology (3)** Rong, Przytycki
Topics may include hyperbolic structures on surfaces and 3-manifolds; knot theory; topology of 3-manifolds; topology of 4-manifolds. Prerequisite: Math 282 or permission of the instructor. May be repeated for credit with permission.
- 295 **Reading and Research (arr.)** Staff
May be repeated for credit.
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

MECHANICAL AND AEROSPACE ENGINEERING

Professors H. Liebowitz, M.K. Myers (*Chair*), R.E. Kaufman, C.M. Gilmore, J.L. Whitesides, D.L. Jones, C.A. Garris, J.D.-Y. Lee, R.H. Tolson, R. Sandusky, T. Tong, I.H. Shames (*Visiting*), P.A. Cooper (*Research*)

Associate Professors C. Mavriplis, Y.-L. Shen, A.D. Cutler

Assistant Professor R. Mittal

Adjunct Professors B.W. Hannah, P. Matic

Professorial Lecturers J.A. Sprague, C.R. Hauer, S.M. Joshi, J. Juang, I. Raju, J.W. Edwards,

G.C. Everstine, A.R. Johnson, J. Sobieski

Associate Professorial Lecturers T.K. O'Brien, A. Auslander, J.K. Soldner

See the School of Engineering and Applied Science for programs leading to the master's, professional, and doctoral degrees.

Note: The following courses are offered at NASA-Langley Research Center and may be offered on campus when arranged: MAE 227, 247, 248, 253, 270, 271.

- 201 Introduction to Manufacturing (3)** Shen
Fundamentals of modern manufacturing. Processes for manufacturing mechanical and electronic components from metals, polymers, ceramics, and silicon. Manufacturing systems, CAD, robotics, and design for assembly. Current capabilities, technological needs, and competitiveness. Examples from high-tech industries. Prerequisite: approval of department. (Fall)
- 203 Experimental Techniques (3)** Cutler and Jones
Sensors; measurement of displacement, temperature, pressure and velocity. Optical methods. Signal conditioning. Computer data acquisition. Uncertainty analysis. Case studies of instrumentation systems such as hot-wire anemometers, laser-doppler anemometers, schlieren shadowgraph and interferometers. Laboratory projects. (As arranged)
- 207 Theory of Elasticity (3)** Lee and Manzari
Introduction to Cartesian tensors; deformation, stress, constitutive relations for linear elasticity; formulation of boundary value problems, variational principles, torsion and bending of prismatic rods, plane problems. Prerequisite: approval of department. Same as CE 231. (Spring)
- 210 Continuum Mechanics (3)** Lee
Kinematics of a continuum, equations of motion, linear isotropic elastic solid, Newtonian viscous fluid, integral formulation of general principles, simple applications. Prerequisite: approval of department. (Fall)
- 220 Applied Computational Fluid Dynamics (3)** Mavriplis
Basic principles of fluid dynamics and aerodynamics. Finite difference and finite volume methods. Fluid flow and heat transfer analysis of thermo-fluid mechanical systems. Computational aerodynamics codes. Individual hands-on experience with a commercial CFD code such as FLUENT. Prerequisite: approval of department. (Fall)
- 221 Fluid Mechanics (3)** Garris and Myers
Continuum, kinematics of fluids; stress and strain rate tensors; fundamental equations of viscous compressible flows. Irrotational flows; sources, sinks, doublets, and vortices. Laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of department. (Fall)
- 222 Applied Aerodynamics (3)** Mavriplis
Introduction to practical and computational methods for solving two-dimensional and three-dimensional aerodynamics problems. Linear methods, nonlinear potential methods, coordinate transforms, and boundary-layer methods. Prerequisite: MAE 221, 286. (Spring, odd years)
- 223 Turbomachinery (3)** Garris
Turbine, compressor, and pump types and uses; dimensional analysis of turbomachines; cycle analysis of gas and steam turbines; energy interchange in fluid machinery; design, characteristics, and performance of turbines, compressors, and pumps; comparison of types of turbines, compressors, and pumps. Prerequisite: MAE 221. (Fall, odd years)
- 224 Viscous Flow (3)** Cutler and Mavriplis
Exact solutions of Navier-Stokes equations; the laminar boundary-layer theory. Reynolds stresses and turbulence; internal, boundary-layer, and mixing flows. Applications to heat and mass transfer and to reacting flows. Prerequisite: ApSc 213, MAE 221, or equivalent. (Fall, even years)
- 225 Computational Fluid Dynamics (3)** Mavriplis and Whitesides
Theory of discrete methods for solving the governing equations of fluid dynamics. Potential flow, Euler equations, Navier-Stokes equations. Emphasis on algorithm development appropriate to modern supercomputers. Prerequisite: MAE 221, 286. (Fall, even years)
- 226 Hydrodynamics (3)** Garris and Myers
Inviscid flows in two and three dimensions and irrotational flow theory; conformal mapping and applications. Helmholtz theorems and vorticity dynamics. Applications, such as finite wing theory, instabilities. Free surface flow, Froude numbers, sheet vortex. Prerequisite: MAE 221 or equivalent. (Spring, odd years)
- 227 Aeroelasticity (3)** Whitesides
Static and dynamic structural deformations; static aeroelasticity (structural deformation, divergence, control effectiveness, and reversal); dynamic aero-

- elasticity (flutter, response to gusts and turbulence); unsteady aerodynamics for 2-D wings; strip theory for 3-D lifting surfaces; piston and Newtonian-flow theories. Prerequisite: MAE 221, 257. (As arranged)
- 228 **Compressible Flow (3)** Cutler and Garriss
Thermodynamics and equations of compressible inviscid flow. One-dimensional flow. Isentropic flow. Normal and oblique shock waves. Quasi-one-dimensional flow. Unsteady one-dimensional and steady two-dimensional flow. Introduction to transonic flow. Prerequisite: ApSc 213, MAE 221 or equivalent. (Spring, even years)
- 229 **Propulsion (3)** Cutler and Garriss
Basic concepts of propulsion: energy transformations in propulsive flows, gas dynamics of combustion. Thermal and propulsive efficiencies. Cycle and engine component analysis. Intake, nozzle performance. Drag and thrust generation. Augmentation. Propellers, turbojets, turbopumps, ramjets, and rockets. Prerequisite: approval of department. (Spring)
- 230 **Space Propulsion (3)** Staff
Advanced chemical propulsion: dynamic combustion and instabilities in solid propellants. Injection, atomization, mixing in liquid propellant engine performance. Plasma propulsion: electrostatic, electromagnetic, and electrothermal instabilities (laser and microwave). Nuclear propulsion. Prerequisite: MAE 229. (Fall, odd years)
- 231 **Structure and Transformations in Materials (3)** Gilmore
Structure of crystals, crystal binding, crystal defects, dislocations, solid solutions, phases, diffusion, phase transformations, deformation twinning, and martensite. Prerequisite: ApSc 130. (Fall, even years)
- 232 **Fracture Mechanics (3)** Lee and Jones
Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture. Linear elastic systems, plasticity considerations, fracture toughness. Engineering analysis, notch-strength analysis with limit approach, crack-propagation laws, fatigue, fracture testing. Prerequisite: approval of department. (Spring, even years)
- 233 **Mechanics of Composite Materials (3)** Lee and Manzari
Stress-strain relationship for orthotropic materials, invariant properties of an orthotropic lamina, biaxial strength theory for an orthotropic lamina. Mechanics of materials approach to stiffness, elasticity approach to stiffness. Classical lamination theory, strength of laminates. Statistical theory of fatigue damage. Prerequisite: approval of department. Same as CE 223. (Spring, odd years)
- 234 **Composite Materials (3)** Gilmore
Principles of composites and composite reinforcement. Micromechanics and failure, interface reactions in various composites, reinforcing materials. Structure of composites: fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of department. (Spring, even years)
- 235 **Deformation and Failure of Materials (3)** Gilmore
Elastic and plastic deformation, yield, dislocation theory, strengthening mechanisms, creep, polymers, fracture, transition temperature, microstructure, fatigue. (Fall, odd years)
- 236 **Materials Recycling and Recovery (3)** Gilmore
Techniques and technologies for recovering and reusing waste materials. Relationships of recycling and waste reduction to energy conservation and environmental impact: legal, economic, institutional, and environmental policy aspects of recycling and waste reduction. Prerequisite: approval of department. (As arranged)
- 237 **Environmental Effects on Materials (3)** Gilmore
Aqueous corrosion, electrochemistry, electrochemical reactions, polarization. Environmental factors, intergranular corrosion, stress corrosion, high-temperature corrosion. Kinetics and mechanisms of corrosion, oxidation, liquid metal corrosion, irradiation effects. Prerequisite: approval of department. (Fall, even years)
- 238 **Introduction to Biomaterials (3)** Gilmore
Fundamentals of materials science and engineering applied to artificial materials in the human body. Topics include biocompatibility, techniques to minimize corrosion or other degradation of implant materials, and the use of arti-

cial materials in various tissues and organs. Prerequisite: MAE 166, ECE 280. (Spring)

240 Kinematic Synthesis (3)

Kaufman

Techniques for the analysis and synthesis of function, path, and motion generating mechanisms. Methods for the dimensional design of mechanisms. Computer-aided techniques for the optimal design of planar linkages. Review of recent developments and current research. Term project. Prerequisite: MAE 190 or equivalent. (Spring, odd years)

241 Computer Models of Physical and Engineering Systems (3)

Kaufman

Reduction of physical and engineering systems to simplified physical and mathematical models. Manipulation of models using C/C++ programming. Numerical algorithms for optimization, graph identification, mini-sum arithmetic, and searching. Styles of problem solving. Prerequisite: MAE 117. (Spring)

242 Advanced Mechanisms (3)

Kaufman

Emphasis on spatial kinematics. Analysis and synthesis of mechanisms. Analytical techniques using matrices, dual numbers, quaternion algebra, finite and instantaneous screws, theory of envelopes. Applications to design of linkages, cams, gears. Use of digital computers in mechanism analysis and design. (Spring, even years)

243 Advanced Mechanical Engineering Design (3)

Jones

Design of mechanical engineering components and systems emphasizing computer-aided engineering (CAE), including interactive computer graphics, finite element analysis, and design optimization. Creation of a complete design on an engineering workstation using I-DEAS. Prerequisite: approval of department. (Fall)

244 Computer-Integrated Engineering Design (3)

Jones

Design of engineering components and systems on engineering workstations using I-DEAS. Interactive computer graphics, finite element analysis, computer-based design optimization, and other relevant computer-based tools. Students apply design concepts in a computer-aided engineering environment to a selected project. Prerequisite: approval of department. (Spring)

245 Robotic Systems (3)

Lee

Classification, features, and applications of industrial robots. Spatial descriptions and transformations, forward and inverse kinematics, Jacobian matrix, velocities and static forces, manipulator dynamics and controls. Robot actuators, transmissions, sensors, end effectors, and programming. Prerequisite: MAE 182 or equivalent. (Spring)

246 Electromechanical Control Systems (3)

Lee

State-space approach to control system analysis and design. Controllability and observability. Optimal stochastic control theory. Introduction to sliding mode control. Applications to robotics and earthquake engineering. Course emphasizes individual hands-on experience with the use of MatLab. Prerequisite: approval of department. (Spring)

247 Aircraft Design I (3)

Sandusky

Conceptual design methods used in response to prescribed mission and performance requirements, alternate configuration concepts. Configuration general arrangement and empennage sizing. Estimation of aircraft size, weight, and balance: lift, thrust and drag; system level tradeoff and sensitivity studies. (Fall)

248 Aircraft Design II (3)

Sandusky

Preliminary design methods used to refine a conceptual aircraft configuration. Area ruling, computer-aided design methods and structural arrangement, estimation of aircraft static and dynamic stability and control sizing, inlet design, detailed tradeoff and sensitivity studies, economic and reliability considerations. (Spring)

249 Spacecraft Design (3)

Staff

Computer-aided design of spacecraft and satellites to meet specific mission requirements. Environment, propulsion, structure, heat transfer, orbital mechanics, control considerations. Use of modern computer codes for design studies. Prerequisite: approval of department. (Spring, odd years)

250 Launch Vehicle Design (3)

Staff

Computer-aided design of hypersonic launch vehicles to meet specific mission requirements. Propulsion, structures, flight path, aerothermochemistry, control

- considerations. Use of modern computer codes for design studies. Prerequisite: approval of department. (As arranged)
- 251 **Computer-Integrated Manufacturing (3)** Shen
Automation techniques for processing metals, polymers, and composites. Use of sensing and process modeling in process control. Numerical control and robot applications and limitations. Integration, scheduling, and tool management in the computer-integrated factory. Quality control. Social and economic considerations in CIM. Prerequisite: MAE 192 or equivalent. (Spring)
- 252 **Projects in Computer-Integrated Design and Manufacturing (3)** Shen
Applications of the concepts of computer-integrated manufacturing to group projects, culminating in written and oral presentations. Robot programming, vision-guided assembly, force sensing, fixturing, and end-effector design for practical applications. Factory simulation, part scheduling, and NC program-verification algorithms. Prerequisite: MAE 251. (Fall, odd years)
- 253 **Aircraft Structures (3)** Staff
Statics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures. Strength and stiffness of locally buckled stiffened structures. Design considerations. Critical evaluation of various design procedures. Prerequisite: approval of department. (As arranged)
- 257 **Theory of Vibrations (3)** Lee
Damped and undamped natural vibration, response of single- and multiple-degrees-of-freedom systems to steady-state and transient excitations, modal analysis, nonproportional damping and complex modes, variation formulation of equations of motion, discretization of structural systems for vibrational analysis. Prerequisite: approval of department. (Fall)
- 259 **Solar Heating Systems (3)** Staff
Methods of solar energy collection and storage. Theory of flat-plate collectors, solar energy system analysis, design of solar water-heating and space-heating systems, economics of solar heating systems. Passive solar heating systems. Solar industrial process heat. Prerequisite: MAE 187 or equivalent. (Fall, odd years)
- 260 **Heating and Air-Conditioning of Buildings (3)** Staff
Heating and cooling load calculations; system design and energy consumption analysis. Codes and standards for building energy management, energy conservation. Heating and air-conditioning systems; central-control systems. Cost estimates. Prerequisite: MAE 187 or equivalent. (Spring, odd years)
- 261 **Air Pollution (3)** Staff
Introductory course on the generation, monitoring, and control of air pollution. Atmospheric pollutants; current levels and health problems. Combustion chemistry and mixing. Photochemical processes; smog and measurements. Atmospheric dispersion; inversion and acid rain. Prerequisite: approval of department. (Fall, odd years)
- 262 **Energy Systems Analysis (3)** Staff
Analysis of energy resources and conversion devices. Statistical data analysis, forecasting, I/O, and net energy analyses, mathematical modeling. Prerequisite: approval of department. (Fall)
- 270 **Theoretical Acoustics (3)** Myers
Basic acoustic theory in stationary and uniformly moving media; waves in infinite space; sound transmission through interfaces; sound radiation from simple solid boundaries, source and dipole fields; propagation in ducts and enclosures; elements of classical absorption of sound. Prerequisite: ApSc 213, MAE 221. (As arranged)
- 271 **Time Series Analysis (3)** Myers
Harmonic analysis of random signals; auto- and cross-correlations and spectra; coherence; modern techniques for spectral estimation, including fast Fourier transform, maximum entropy, and maximum likelihood; bias and variability; randomly sampled data; digital filtering; applications. Prerequisite: approval of department. (As arranged)
- 273 **Principles of Automatic Flight Control (3)** Staff
Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of department. (Spring)

- 274 Spacecraft Dynamics (3)** Tolson
Fundamentals of satellite attitude dynamics and passive stabilization. Spacecraft attitude representation, rotational kinematics and kinetics. External torques. Dynamics of gyroscopes. Gravity gradient stabilization. Effect of internal energy dissipation on stability of spinning bodies and methods of despin. Dual spin satellites. Numerical simulation using MatLab. Prerequisite: approval of department. (Spring, even years)
- 275 Stability and Control of Aircraft (3)** Klein
Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques, and frequency-response analysis. Prerequisite: approval of department. (Fall, even years)
- 276 Space Flight Mechanics (3)** Tolson
Coordinate and time systems. Newton's laws; 2-, 3-, and n-body problems, Lagrange points, gravity assisted trajectories, variation of parameters and orbit perturbations, non-central gravity effects, drag, sun-synchronous, and formation orbits. Numerical applications using MatLab. Prerequisite: approval of department. (Fall, even years)
- 277 Spacecraft Attitude Control (3)** Tolson
Control of spinning and three-axis stabilized spacecraft. Elements of linear control theory for single-input, single-output systems and basic feedback control laws. Momentum management and actuator desaturation. Sensors for attitude determination. Application of modern control for multi-input, multi-output systems. Control system simulations using MatLab. (As arranged)
- 278 Space Flight Guidance and Navigation (3)** Tolson
Fundamentals of spacecraft guidance and navigation. Single, double, and multi-impulse orbit changes, Lambert's Theorem, rendezvous and interception, batch and sequential orbit determination, guidance strategies for fixed and variable flight time problems. Numerical applications using MatLab. (Fall, even years)
- 280 Intermediate Thermodynamics (3)** Staff
Review of First and Second Laws of Thermodynamics and combining the two through exergy; entropy generation minimization and applications. Single phase systems, exergy analyses, multiphase systems, phase diagrams and the corresponding states principle. Prerequisite: approval of department. (Fall)
- 281 Advanced Thermodynamics (3)** Staff
Development of classical and quantum statistical mechanics, including Maxwell-Boltzman distributions and microscopic origins of entropy and other thermodynamic variables. Partition functions and micro- and grand-canonical ensembles; Fermi-Dirac, Bose-Einstein, and intermediate statistics. Einstein and Debye models of solids. Prerequisite: MAE 280 or equivalent. (As arranged)
- 282 Convective Heat and Mass Transfer (3)** Cutler and Garriss
Heat and momentum transfer in laminar and turbulent flow. The laminar boundary-layer solution. Similarity and nondimensional parameters. Mass-momentum heat transfer analogy. Convective heat transfer at high velocity. Stability, transition, and turbulence. Free convection. Prerequisite: MAE 221 or equivalent. (Spring, odd years)
- 283 Radiative Heat Transfer (3)** Cutler and Skelton
Basic concepts of heat transfer by thermal radiation starting from Planck's equation for blackbody radiation. Realistic engineering problems are addressed, some involving radiative heat transfer with a variety of surfaces, geometries, and enclosures. Radiative heat flow combined with conduction and convection boundaries. Prerequisite: approval of department. (Fall, odd years)
- 284 Combustion (3)** Garriss
Basic combustion phenomena. Rate processes and chemical kinetics. Chain reaction theory. Detonation, deflagration, diffusion flames, heterogeneous combustion. Experimental measurements. Impact of pollution regulations and alternate fuels. Prerequisite: approval of department. (Spring, even years)
- 286 Numerical Solution Techniques in Mechanical and Aerospace Engineering (3)** Staff
Development of finite difference and finite element techniques for solving elliptic, parabolic, and hyperbolic partial differential equations. Prerequisite: ApSc 213 or equivalent. (Fall)

- 287 Applied Finite Element Methods (3)** Lee
Basic aspects of theory and application of finite element methods. Utilization of MSC/NASTRAN for static, dynamic, linear, and nonlinear analyses of problems in mechanical, aeronautical, and astronautical engineering. Course emphasizes individual hands-on experience with the MSC/NASTRAN code. Prerequisite: approval of department. (Fall)
- 288 Advanced Finite Element Methods in Structural Mechanics (3)** Lee and Manzari
Review of variational formulation of the finite element method. Formulation of various continuum and structural elements. Application to static and dynamic problems in elasticity, plasticity, large deflection, and instability in plates and shells. Recent developments in finite element methods. Prerequisite: CE 210, MAE 286. Same as CE 228. (Spring, even years)
- 290 Special Topics in Materials Science (3)** Staff
Selected subjects of current interest. Arranged by consultation between department faculty and students. Typical topics include Experimental Methods in Materials Science and Nondestructive Inspection of Materials. Prerequisite: approval of department. (As arranged)
- 291 Special Topics in Mechanical Engineering (3)** Staff
Selected subjects of current interest. Arranged by consultation between department faculty and students. Typical topics include tribology, power systems design, and plasticity theory. Prerequisite: approval of department. (As arranged)
- 292 Special Topics in Aerospace Engineering (3)** Staff
Selected subjects of current interest. Arranged by consultation between department faculty and students. Typical topics include environmental noise control, aeroacoustics, hypersonic flow, and flight vehicle aerodynamics. May be repeated for credit. Prerequisite: approval of department. (As arranged)
- 298 Research (arr.)** Staff
Basic research projects as arranged. May be repeated for credit.
- 299-300 Thesis Research (3-3)** Staff
- 350 Advanced Topics in Materials Science (3)** Staff
Topics such as surface science that are of current research interest. Selected after consultation between department faculty and students. Prerequisite: approval of department. (As arranged)
- 351 Advanced topics in Mechanical Engineering (3)** Staff
Topics such as advanced analytical mechanics, advanced mechanics of continua, and advanced theory of elasticity that are of current research interest. Selected after consultation between department faculty and students. Prerequisite: approval of department. (As arranged)
- 352 Advanced Topics in Aerospace Engineering (3)** Staff
Topics such as nonsteady flow, physical gas dynamics, turbulence, and nonlinear wave propagation that are of current research interest. Selected after consultation between department faculty and students. Prerequisite: approval of department. (As arranged)
- 398 Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to Doctor of Science candidates. May be repeated for credit.

MEDIA AND PUBLIC AFFAIRS

Professors C.H. Sterling, J.B. Manheim (*Director*), J.L. Folkerts, C. Stern, S.V. Roberts
Associate Professors J.E. Thiel, J.E. Steele, S.L. Livingston, L.S. Harvey, A.L. May III, L. Willnat

Assistant Professors S. Keller, P.C. O'Brien, P.F. Phalen, D. Liban, S. Aday, K.A. Gross

Master of Arts in the field of media and public affairs—Prerequisite: An undergraduate degree in mass or political communication, journalism, electronic media, or a related program.

Required: the general requirements stated under Columbian College of Arts and Sciences and completion of 36 credit hours, including SMPA 201, 202, 210, 240, and 241; 6

credit hours outside SMPA as approved by the advisor; 9 credit hours of SMPA topic courses or related credits outside SMPA as approved by the advisor; 6 hours of thesis research or additional course work approved by the advisor. A written comprehensive examination must be passed after completion of the five required SMPA courses.

With permission of the director of graduate studies, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 201 Media Processes and Institutions (3)** Sterling, Phalen
Analysis of the interactions among media organizations, societal institutions, and citizens in a democracy. How economic pressures, audience behavior, history, and technology shape the content and character of American mass media. (Fall)
- 202 Media Theory and Effects (3)** Folkerts, Willnat, Aday
Survey of media effects research. Focus on the individual attitudinal, affective, and cognitive effects resulting from media exposures of various types and on other institutional, social, and cultural effects. (Fall)
- 210 Media and Public Affairs (3)** Livingston, Manheim, Gross
Examination of the influence of media in the shaping and conduct of public affairs. Topics include politics of news making, political uses of media content, role of media in shaping dialogue on public issues, and theoretical basis of strategic communication. (Spring)
- 240 Qualitative Media Research Methods (3)** Folkerts and Staff
Qualitative research methods and conceptual approaches to studying media, including case studies, history, biography, interviewing, ethnography, participant observation, and fieldwork. Sources and databases and other archival collections. Various social, cultural, and historical approaches to media analysis. (Spring)
- 241 Quantitative Media Research Methods (3)** Livingston, Manheim, Willnat
Design, applications, and limitations of quantitative research as applied to the field of media and public affairs. Framing of research questions, identification of variables and formulation of hypotheses, measurement, sampling, data gathering techniques, data analysis, and preparation of research reports. Prerequisite: an undergraduate statistics course. (Fall)
- 250 Topics in Media Processes and Institutions (3)** Folkerts, Steele, Sterling, Phalan
Topics address such issues as the history of media content, institutions, and process; impact of changing communications technology on culture; history and development of mass-produced culture in the United States; and professional ideology and practice of journalism. May be repeated for credit provided the topic differs. Prerequisite: SMPA 201.
- 260 Topics in Theory and Effects (3)** Harvey, Willnat, Aday
Topics address such issues as the relationship between broadcast content and the construction of social perceptions; anthropology of media, and viewership, readership, and the changing American audience. Prerequisite: SMPA 202.
- 270 Topics in Media and Public Affairs (3)** Livingston, Manheim, Gross
Topics explore such areas as social theories of public opinion and mass media's response; effects of global news media on conduct of U.S. foreign and military policy; and the role of mass media in constructing social perceptions of the scientific process and its relationship to cultural and material life. Prerequisite: SMPA 210.
- 280 Topics in Research (3)** Staff
Courses under this topic examine advanced research methods used in the study of media effects, history, law, and policy. May be repeated for credit with departmental approval. Prerequisite: SMPA 240, 241.
- 296 Directed Readings and Research (3)** Staff
Independent research with SMPA faculty member. Must be approved in advance by supervising professor and director of graduate studies. May be repeated for credit with departmental approval.
- 297 Field Experience (1 to 3)** Staff
Students spend 12–20 hours per week in an approved position. Outside reading and/or research under the supervision of an SMPA faculty member. Grades are credit only. May be repeated for credit with departmental approval.

298 Independent Study (1 to 3)

Staff

Independent research project conducted with a faculty advisor. Must be approved by director of graduate studies.

299-300 Thesis Research (3-3)**MICROBIOLOGY AND TROPICAL MEDICINE**

The Department of Microbiology and Tropical Medicine offers the courses listed below in support of basic science programs offered by Columbian College of Arts and Sciences. The Department participates in the new Master of Science in the field of genomics and bioinformatics offered by Columbian College of Arts and Sciences in cooperation with the School of Medicine and Health Sciences and the School of Engineering and Applied Science. The program is under development as this Bulletin is being prepared; please check with the Department of Biochemistry and Molecular Biology or the Department of Microbiology and Tropical Medicine for program requirements.

201 Interdisciplinary Medical Microbiology (5)

Provides an interdisciplinary approach to the study of infectious organisms and associated diseases by combining aspects of fundamental microbiology, infectious disease, pharmacology, and pathology.

229 Fundamental Immunology (3)

Albright

Lecture course. Fundamental immunologic concepts. Antigens, antibodies, antigen and antibody reactions *in vitro* and *in vivo*, and the immune response. Prerequisite: Bioc 221-22. (Fall)

233 Virology (3)

Stokes

Biochemical, genetic, and pathogenic characterization of viruses. Prerequisite: Bioc 221-22 or permission of instructor. (Spring)

235 Human and Transforming Viruses (3)

Holland

Current concepts of transformation and disease caused by RNA and DNA viruses. Prerequisite: Micr 233. (Fall)

236-37 Fundamentals of Genomics and Proteomics (2-2)

McCaffrey

Same as Bioc 236-37.

292 Tropical Infectious Diseases (2)

Hotez

Lecture course. Pathogenesis, natural history, and epidemiology of the major infectious diseases that occur in developing countries.

293 Special Topics (arr.)

Staff

Selected topics in microbiology. May be repeated for credit. (Fall and spring)

MOLECULAR AND CELLULAR ONCOLOGY

S.R. Patierno (*Director*), J.D. Ahlgren, P. Berg, B. Bouscarel, A.M. Colberg-Poley, E.C. DeFabo, N. DiFronzo, S. Evans, A.L. Goldstein, C.C. Haudenschild, R. Hawley, C. Holland, V. Hu, F. Kashanchi, A.D. Keegan, J.K. Kelleher, K.A. Kennedy, A. Kumar, S.K. Ladisch, P.S. Latham, H.G. Mandel, M.J. Manyak, G. Merlino, F.P. Noonan, J.M. Orenstein, J.M. Rosenstein, D. Scott, R.S. Siegel, D. Stephan, M.A. Stepp, M. Sutherland, J.A. Winkles, X. Zhan

Doctor of Philosophy in the field of molecular and cellular oncology—Prerequisite: A bachelor's degree in chemistry, biological sciences, or an approved related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work must include the biomedical sciences core curriculum and Onco 221, 222, 224. Courses related to molecular and cellular oncology that may be included in the program include: Anat 260; Bioc 234, 250, 251, 252, 270; BiSc 227, 229, 230, 274, 275; E&RP 210; Gnet 256; Micr 229, 233, 258; Phar 240, 242.

Research fields: Chemical, viral, nutritional, UV light, and radiation carcinogenesis; tumor cell biology and metabolism; gene regulation; oncogenes and tumor suppressor genes; growth factors; chemotherapy and mechanisms of resistance; radiotherapy; immunotherapy; immunology of bone marrow transplant; development of immunological and molecular markers for diagnosis and detection; tumor immunology; epidemiology and prevention; cancer and AIDS; mechanisms of metastasis; transgenic models of cancer.

221 The Basic Science of Oncology (3)

Epidemiology, genetics, viruses, oncogenes, chemical carcinogenesis, radiation carcinogenesis, tumor growth, metastasis, biochemistry of cancer cells, tumor

markers, hormones and cancer, cancer immunobiology, radiotherapy, chemotherapy and immunotherapy. (Fall)

222 **Molecular Oncology** (2)

Seminar course dealing with molecular basis for the topics introduced in Onco 221. (Spring)

224 **Research Seminar** (2)

Forum for students to present their research findings before fellow students and program faculty for critical evaluation. Admission by permission of instructor.

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

MUSEUM STUDIES

Committee on Museum Studies

I.P. DeAngelis (*Director*), K. Rice, C.R. Rose, A.D. Andrews, J. Vlach

Columbian College of Arts and Sciences offers an interdepartmental program leading to the degree of Master of Arts in the field of museum studies. The program is designed for those who seek a deepening of their primary academic interest along with training in the broad range of talents required in the successful operation of museums. The goal of the program is to produce graduates who are prepared to assume museum positions that require both scholarship and functional skills. (Students whose career interests are primarily curatorial should consider applying for the Master of Arts in their academic discipline with a concentration in museum training; those interested in museum education should refer to the Master of Arts in Teaching under the Graduate School of Education and Human Development.)

Students applying for candidacy in the Museum Studies Program must meet all general requirements for admission to Columbian College of Arts and Sciences. The student must have an undergraduate major, or its equivalent, relevant to the proposed academic core and must be able to demonstrate a sufficient breadth of academic preparation to support the proposed graduate course of study. Prior museum training is not a requirement.

In preparing the academic core portion of the program of study, students draw on courses offered by the appropriate academic departments. Courses that pertain to the museum studies portion of the program are described below and are supplemented by additional courses offered by other departments, such as American Studies, Anthropology, Educational Leadership, Fine Arts and Art History, and Theatre and Dance.

Master of Arts in the field of museum studies—Required: the general requirements stated under Columbian College of Arts and Sciences. The degree requires a minimum of 42 hours of course work. At least 15 hours of course work must be in an academic core discipline, for example, American studies, anthropology, biological sciences, geology and paleobiology, history, or an appropriate interdisciplinary combination. A concentration in art history is possible only in the Department of Fine Arts and Art History. At least 15 hours of course work must be in museum studies courses that concern such functions as museum administration, collections management, exhibiting, and object care and conservation. At least 6 hours must be in museum internships in the Washington area or elsewhere. The student must pass a comprehensive examination based on course work and submit a research paper.

201 **Introduction to Museum Studies:**

History and Philosophy of Museums (3)

Museums viewed from historical, philosophical, and practical perspectives. Examination and comparison of types of collecting organizations. Analysis of contemporary studies on the status of museums and their public programs. (Fall)

202 **Introduction to Museum Studies: Administration** (3)

Staff

Overall operation of the museum; legal status of the museum and its obligations to the public; governance, staffing, policymaking as a nonprofit organization. Theory applied to practical situations. (Spring)

203 **Fiscal Management of Nonprofit Organizations** (3)

Rinker

Basic concepts of general accounting; fund accounting for nonprofit organizations; budgets and budget systems; use of the budget as a management tool;

long-range planning; income sources; other financial management concepts. (Spring)

- 215 **Collections Management: Legal and Ethical Issues** (3) DeAngelis
Establishing collections policies; laws, regulations, conventions, and codes that affect acquisitions, deaccessions, loans, and collection care; accountability; access problems. (Fall)
- 216 **Collections Management: Practical Applications** (3) Staff
The implementation of collections policies: establishing and managing collections, management procedures and systems, documentation of collections, records preservation, collections access and storage, handling, packing and shipping, and inventory control. (Spring)
- 270 **Museum Exhibition: Curatorial Research and Planning** (3) Rice
Museum research from a curatorial point of view, with emphasis on exhibit theory and practice. Research techniques, information sources, script production. May be repeated for credit. (Fall and spring)
- 271 **Museum Exhibition: Design Processes** (3 or 6) Sims, Volkert
The processes of research, conceptualization, planning, and evaluation from a designer's point of view. Focus is on individual projects with some group collaboration. The designer's vocabulary, visual thinking, design documentation, and specifications. (Fall and spring)
- 287 **Museums and Technology** (3) Rice and Staff
Issues related to the use of technology in museums, with emphasis on interpretation. Same as Educ 287. (Spring)
- 291 **Museum Internship** (1 to 6) DeAngelis
Individual work experience in museums of the Washington area and possibly elsewhere. Each student should make arrangements with the Museum Studies Program staff. Museum internships are supervised by one or more members of the cooperating museum staff in the areas of museum management, object care and conservation, exhibiting. (Fall, spring, and summer)
- 295 **Directed Research** (3) Staff
Individual research on special topics in the museum field. Topics must be approved by the Director of the Museum Studies Program. May be repeated for credit. (Fall, spring, and summer)
- 297 **Special Topics** (3) Staff
May be repeated for credit provided the topic differs.

NEUROSCIENCE

V.A. Chiappinelli (*Director*), J. Battey, M. Batshaw, A. Chiaramello, S. Dopkins, C. Fraser, T. Hales, E. Hoffman, S. Huang, J.J. Kelly, E. Kirkness, J.M. Krum, D. Lawrence, C.W. Linebaugh, D. Mendelowitz, S.A. Moody, T.W. Moody, J. Neiderhiser, R. Oakley, R.J. Packer, D.C. Perry, K.D. Peusner, J. Philbeck, D. Reiss, J.M. Rosenstein, R.E. Rosenthal, L.A. Rothblat, D. Schessel, S.J. Schiff, E.M. Sorenson, D. Strickland, M.L. Sutherland, R.J. Walsh, L.L. Werling

Doctor of Philosophy in the field of neuroscience—Prerequisite: A bachelor's degree in chemistry, biological sciences, or an approved related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. Course work must include the biomedical sciences core curriculum, with BmSc 214, and NeuS 292, 294; Psyc 268 or 281. Electives may include Bioc 250, 280; BiSc 249, 274, 275; Phar 280.

Research fields: cerebral ischemia, neural transplantation, molecular mechanisms of action of drugs of abuse, neurotransmitter systems, neuropeptides, developmental neurobiology, psychobiology of learning and memory, function of ion channels, receptors, and transporters.

- 285 **Neurophysiology** (3) Hales
Basic principles of electrophysiology and electrophysiological techniques.
- 292 **Seminar** (1) Sorenson
Research reports and discussions by guest lecturers, faculty, and students. May be repeated once for credit.
- 294 **Current Topics in Neuroscience** (1) Sorenson
Presentations and discussion on current topics based on journal publications.

- 296 **Advanced Studies (1)** Staff
Presentation and discussion of research by invited speakers. A different area of neurobiology will be studied each semester.
- 398 **Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 **Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

ORGANIZATIONAL SCIENCES

Associate Professors H. Beazley, E.B. Davis (*Director*), G.E. Dehler, D.P. Costanza
Instructor R. Axelrod (*Visiting*)
Professorial Lecturers R. Sadacca, B. Kutnick, S. Wehrenberg, C. Bevis
Associate Professorial Lecturers J. Brock, D. Koehn
Assistant Professorial Lecturer L. Nabors

Columbian College of Arts and Sciences offers interdepartmental organizational sciences programs leading to the degree of Master of Arts in the fields of human resources management and organizational management. The programs have been designed for public and private sector professionals who wish to increase their managerial competence, enhance their leadership ability, and improve their career potential. The curricula provide knowledge and skills in the social and behavioral sciences. In addition, graduate certificates in leadership coaching and in organizational management are offered.

Master of Arts in the field of human resources management—Prerequisite: a bachelor's degree with a *B* average from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences, including 36 credit hours of course work. There is no thesis requirement. All students must pass a Master's Comprehensive Examination. The following courses are required: OrSc 209, 212, 214, 222, 223, 248; Econ 219; Psyc 245; Stat 104.

Master of Arts in the field of organizational management—Prerequisite: a bachelor's degree with a *B* average from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences, including 36 credit hours of course work. There is no thesis requirement. All students must pass a Master's Comprehensive Examination. The following courses are required: OrSc 209, 216, 241, 242, 243; Econ 219; Psyc 245, 259; Stat 104.

- 201 **Principles of Management Information Systems (3)**
An overview of the management information systems specialty track. Integration of management, information, and systems concepts into a unified framework. Management information systems development, design, implementation, and evaluation strategies.
- 209 **Management Systems (3)**
An overview of management systems using the systems approach to management and problem solving; understanding long-range planning; management of complex problems using computer systems; use of work breakdown structures; critical-path planning systems and network analysis; cost-effectiveness analysis; program evaluation.
- 212 **Current Issues in Personnel Testing and Selection (3)**
Psychometric, legal, and organizational issues in personnel employment testing and selection, reliability and validity of selection instruments, and the utility of selection systems. The legal environment, including test fairness in selection, adverse impact, and statistical models of test fairness and specific selection techniques. Prerequisite: Stat 104.
- 214 **Personnel Training and Performance Appraisal Systems (3)**
Management training programs and training evaluation techniques. Performance appraisal techniques, appraisal systems, relationship of rewards to performance and the appraisal interview. Training and rating systems that satisfy legal requirements and stimulate employee productivity.
- 216 **Theories and Management of Planned Change (3)**
A systems view of organizational change and development, including intervention strategies, data collection, diagnosis, and the integration and management of system-wide organizational change.

- 217 **Productivity and Human Performance (3)**
Definitions and measurement of individual, team, and organizational productivity, effectiveness, and efficiency. Models for the analysis of organizational and individual productivity and productivity growth in industrialized nations. Techniques for increasing productivity.
- 222 **Theory and Practice of Compensation Management (3)**
Analysis of contemporary compensation systems from both theoretical and practical perspectives, including the latest decisions of courts and regulatory agencies. Examination of motivational theories of pay, determinants and effects of salary structures on performance, incentive plans, performance-based compensation, and managerial compensation systems.
- 223 **Collective Bargaining (3)**
Analysis of federal and state employee relations laws and regulations. Topics include the bargaining environment, wage and benefit issues in arbitration, arbitration of grievances, employee relations in non-union organizations, and behavioral theories of labor negotiations.
- 241 **Strategic Management and Policy Formation (3)**
Processes and theories of strategic management in the profit and not-for-profit sectors. Analysis of behavioral, sociopolitical, and economic forces underlying strategy formulation. Issues of strategic competitive advantage; corporate diversification; multinational corporations; evaluation and choice; and implementation of functional and corporate strategies.
- 242 **Organizational Communication and Conflict Management (3)**
Theories and models of communications and communication media; barriers to effective communication and techniques for improving interpersonal, group, and organizational communications. Sources of conflict in organizations at the individual, group, and organizational levels; methods of conflict management and resolution.
- 243 **Seminar: Leadership in Complex Organizations (3)**
The view of leadership taken in this seminar extends theories beyond the interpersonal, near-immediate time frame toward an organizational perspective in which cause-and-effect linkages are traced. The leadership role as an attribute of a system. How effective leaders reduce uncertainty through appropriate adaptive change.
- 246 **Comparative Management (3)**
International dimensions of management over a broad spectrum of topics, including cross-national transfer and management practices in a global economy; cross-cultural interaction, business-government relations; expatriation and repatriation processes, international strategic management; technology transfer; globalization of human resources management.
- 248 **Strategic Human Resource Planning (3)**
Overview of the principles of human resource planning. Model for determining human resource requirements, including forecasting, goal setting, human resource auditing, and environmental scanning. Analysis of the interfaces between human resource planning and personnel selection, job design, training, compensation, and related functions.
- 249 **Human Resource Information Systems (3)**
Analysis of information systems designed to support planning, administration, decision making, and control activities of human resource management. Examination of applications such as personnel selection and performance appraisal systems, payroll and benefit management, and career pathing.
- 250 **Leadership Coaching: Principles and Practices (3)**
An introduction to leadership coaching, including behavioral sciences roots; communication and conflict resolution skills, motivation, personality and performance assessments. Coaching vs. related practice areas: business coaching vs. personal coaching. Professional and ethical standards.
- 251 **Team Coaching and Facilitation (3)**
Application of the fundamentals and governing values of leadership coaching to the development of productive work groups and communities. The art and practice of facilitation as applied to team learning and the encouragement of breakthrough thinking and team problem solving. Prerequisite: OrSc 242, 250.
- 252 **Practicum in Leadership Coaching (3)**
Supervised experience as a recipient and practitioner of leadership coaching. Prerequisite: OrSc 242, 250.

295 Directed Research (arr.)

Supervised research in selected fields within organizational sciences. Admission by prior permission of faculty advisor and instructor.

297 Special Topics (3)

Special topics in human resource strategic planning, computer-based learning, human-computer interaction, management information technology, knowledge management, coaching, and organizational design.

298 Directed Readings (arr.)

Supervised readings in selected fields within organizational sciences. Admission by prior permission of faculty advisor and instructor.

PATHOLOGY

The Department of Pathology offers the courses listed below in support of basic science programs offered by Columbian College of Arts and Sciences. Check with the department for specific prerequisites to courses.

201-2 Pathology (3-4)

Latham and Staff

A general introduction to concepts of disease and the pathology of organ systems. The nature and pathogenesis of specific diseases involving each of the major organ systems. Gross and microscopic study of diseased tissues. For second-year M.D. students; open to Ph.D. students. (Academic year)

219 Current Topics in Pathophysiology (2)

Latham

Overview of systemic pathophysiology, highlighting topical areas of research. For students in Institute for Biomedical Sciences programs. (Summer)

229 Pathology for Health Sciences (4)

Latham and Staff

Fundamental disease processes; causation, evolution, and morphology of pathological changes in the principal diseases of each organ system. For students in health sciences programs in the School of Medicine and Health Sciences; open to Ph.D. students.

PHARMACOLOGY

Professors H.G. Mandel, F.P. Abramson, K.A. Kennedy, V.A. Chiappinelli (*Chair*), S.R. Patierno, D.C. Perry, L.L. Werling

Associate Professors D. Mendelowitz, P. Lecchi (*Research*), E.M. Sorenson (*Research*), T.G. Hales

Assistant Professors M.L. Sutherland, J. Z. Guo (*Research*), P.A. Davies (*Research*)

Doctor of Philosophy in the field of pharmacology—Required: the general requirements stated under Columbian College of Arts and Sciences. Course requirements include the biomedical sciences core curriculum and Phar 203, 205, 206, 254, 269, and 275.

Research fields: molecular carcinogenesis, genetic toxicology, cancer chemotherapy, neuropharmacology, biochemical and molecular pharmacology and toxicology, drug metabolism, pharmacokinetics, microanalytic pharmacology.

203 Introduction to Pharmacological Research and Applications (2)

Werling

Introduction to current areas of research interest in pharmacology and toxicology; latest techniques for research; review of recent literature. Prerequisite: BmSc 210, 211, 212; or permission of instructor.

205 Pharmacology (7)

Perry

Basic principles of pharmacology, including receptor mechanisms, membrane phenomena, drug distribution and metabolism and pharmacokinetics. Lectures, laboratories, and tutorials on the interactions of drugs and biological systems as a basis for rational disease therapy. Prerequisite: BmSc 210, 211, 212; or permission of instructor. (Fall)

206 Advanced Pharmacology (3)

Staff

Principles of pharmacology and toxicology, including mechanisms of mutagenesis, carcinogenesis and teratogenesis, and organ toxicology. Lectures and tutorials on the interactions of drugs and specific organ systems, and on recent advances in molecular pharmacology. Prerequisite: Phar 205. (Spring)

230 Special Topics in Toxicology (arr.)

Staff

Selected aspects of toxicology. Content differs each time the course is offered. May be repeated for credit. (Fall and spring)

- 240 Molecular Pharmacology and Toxicology (2)** Patierno
The impact of molecular biology on pharmacology and toxicology. Molecular mechanisms of drug and chemical action. Gene regulation in metabolism, receptor activity, signal transduction, and cellular stress responses. Gene therapy. Prerequisite: Phar 205, or permission of instructor. (Spring)
- 242 Molecular Carcinogenesis (2)** Patierno
Molecular biology of cancer initiation and progression. Molecular mechanisms of DNA sequence alteration and repair. Oncogenes, tumor suppressor genes, and metastasis suppressor genes. Admission by permission of instructor.
- 254 Frontiers in Pharmacology (1)** Staff
Recent advances and research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)
- 259 Readings: Cancer and Cancer Chemotherapy (2)** Staff
Selected readings and discussion of recent advances in cancer and cancer chemotherapy research. Prerequisite: Phar 205. (Spring, odd years)
- 269 Pharmacology Seminar (1)** Staff
Recent advances in pharmacology research. Content differs each time the course is offered; may be repeated once for credit. (Fall)
- 272 Physiological Disposition of Drugs (3)** Staff
Mechanisms for the absorption, distribution, metabolism, and excretion of drugs and the physical, chemical, and biological factors affecting these processes are studied through extensive reading of classical and current original literature. Prerequisite: Phar 205 or permission of the instructor. (Spring)
- 273 Pharmacokinetics: Principles and Applications (2)** Abramson and Staff
A description of compartmental and physiological models of drug disposition. Problem solving to obtain rate constants, organ clearances, etc., from experimental data. Examples of drug disposition exemplifying various pharmacokinetic approaches. (Spring)
- 275 Advanced Topics in Pharmacology and Toxicology (1)** Abramson and Staff
Lectures and seminars on advances in mechanisms of drug action, pharmacology of new drugs, theoretical aspects of pharmacology, laboratory techniques. May be repeated for credit. (Fall and spring)
- 280 Neuropharmacology (3)** Perry, Werling
Fundamental principles. Neurotransmitters and their pathways in the central nervous system. Electrophysiological, molecular, and biochemical techniques. Drug effects on neurotransmitter pathways. Biochemical basis of mental disease. Prerequisite: Phar 205 or permission of instructor. (Spring, even years)
- 295 Reading and Research (arr.)** Staff
May be repeated for credit.
- 398 Advanced Reading and Research (arr.)** Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit.

PHILOSOPHY

University Professors P.J. Caws, K.F. Schaffner

Professors W.B. Griffith, R.P. Churchill (*Chair*)

Associate Professor D. DeGrazia, G. Weiss

Assistant Professors I. Farber, M. Friend, E.J. Saidel, K.P. Dougherty

Master of Arts in the field of public policy with a concentration in philosophy and social policy—An interdisciplinary program that brings the normative, historical, and analytical-logical skills of philosophical inquiry to bear upon contemporary problems of social policy. Prerequisite: a bachelor's degree from an accredited college or university. Students are expected to have completed the prerequisites to graduate courses.

Required: the general requirements stated under Columbian College of Arts and Sciences. Two options are available at the discretion of the faculty: (1) a minimum of 24 credit hours of approved graduate course work plus the successful completion of a thesis (Phil 299–300), or (2) a minimum of 36 credit hours of graduate course work that does not include a thesis. All students are required to take four courses selected from Phil 230, 231, 235, 238, 242, 250, 255, 262, 281, Phil 775; and, for the public policy core, four courses, one from each of the following groups: (a) PSc 229, 212, 217; (b) Econ 217, 221, 237, 248;

(c) PSc 203, WStu 240, E&RP 210, Hist 214; (d) PPol 202, Stat 183 or 111, PAd 296. Electives may focus on a particular policy area (e.g., biomedical/health care, urban/welfare, or environmental policy), or may explore varied approaches and policy issues. Each candidate must pass a Master's Comprehensive Examination based on the particular interdisciplinary composition of the student's program of study. Prospective candidates should consult Professor W.B. Griffith, program director.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201-2 Readings and Research (3-3)

Griffith and Staff

Advanced readings and reports. Investigation of special problems.
(Academic year)

214 Structuralism and Hermeneutics (3)

Caws

The notion of structure in the human sciences: its antecedents, linguistic expression, and development in philosophy, anthropology, psychoanalysis, historiography, and criticism. Strategies for the decoding of structure in hermeneutics. The apparent metamorphosis of structuralism in postmodern thinkers.

230 Ethical Issues in Policy Arguments (3)

Griffith

Critical analysis of ethical foundations of public policy arguments (protection of the environment, health and safety, equality of opportunity). Case studies of appeals to societal values (preference-satisfaction, welfare improvements), to norms of justice or fairness, and to moral rights. Attention to historical contexts and commitments and to racial, gender, and class biases. (Fall)

231 Economic Justice (3)

Griffith

Ethical and economic analysis of equity and efficiency of current U.S. income distribution patterns. Theories of justice; economic theories of distribution; assessment of redistribution policies.

235 Ethics and Business (3)

Griffith, Lenn

Concepts and strategies of ethical analysis applied to specific business problems, e.g., risk management, plant relocation, preferential hiring, political advertising; development of theory of corporate social responsibility. Same as SMPP 291. (Spring)

238 Feminist Ethics and Policy Implications (3)

Weiss

Feminist critiques of traditional ethical reasoning; alternative feminist ethical frameworks examined and applied to contemporary social problems (e.g., reproductive technology, genetic engineering). Prerequisite: Phil 125 or 131 or permission of instructor. Same as WStu 238. (Spring, alternate years)

242 Philosophy, Law, and Social Policy (3)

Staff

Examination of basic questions about the role law can and should play in society. Topics include the nature and basis of rights; theories of constitutional interpretation; proposals for legal and political reform of Western liberal democracy. (Spring)

250 Topics in Health Policy (3)

DeGrazia

Topics in health policy from the perspective of philosophical ethics, including human and animal research, the enhancement of human traits, justice and health care allocation.

255 Philosophy of Social Science (3)

Staff

An examination of philosophical problems arising from efforts to gain a systematic understanding of society and culture. Topics include the relationship of social science to natural science, feminist social science, rationality, cultural relativism, hermeneutics, and critical theory.

262 Normative Issues in Foreign Policy (3)

Churchill

Selected issues on foreign policy from a normative perspective, including global poverty and distributive justice, sustainable development, environmental management, the protection of human rights, and the ethics of military intervention.

281 Environmental Philosophy and Policy (3)

Churchill

Development of philosophical frameworks for analyzing and appraising a wide range of environmental issues and modes of analysis. Attention to both classical problems (pollution, biodiversity) and the new "sustainable economy/ecology" paradigm shift, and to both microeconomic and biocentric modes of analysis and argument.

299-300 Thesis Research (3-3)

Staff

PHYSICS

Professors D.R. Lehman, B.L. Berman, L.C. Maximon (*Research*), W.C. Parke (*Chair*), R.A. Arndt (*Research*), W.J. Briscoe
Associate Professors N.K. Khatcheressian, E.P. Harper, J.R. Peverley, H. Haberzettl, K.S. Dhuga, C. Bennhold, M.E. Reeves, G. Feldman, I. Strakovsky (*Research*), R.L. Workman (*Research*)
Assistant Professors F.X. Lee, C. Zeng, S. Strauch (*Research*)
Adjunct Professor E.F. Skelton
Associate Professorial Lecturers J.T. Broach, M.F. Corcoran, B.A. Ratnam

Master of Arts in the field of physics—Prerequisite: a bachelor's degree with a major in physics at this University, or an equivalent degree

1. The master's degree program *with thesis*—Required: the general requirements stated under Columbian College of Arts and Sciences, and 30 credit hours of course work in physics, including Phys 211, 213–14, 221–22, and two courses chosen from Phys 224, 225–26, 231, 233, 234, 243, 244; plus 6 credit hours of thesis, Phys 299–300.

2. The master's degree program *without thesis*—Required: the general requirements stated under Columbian College of Arts and Sciences, and 36 credit hours of course work in physics including Phys 211, 213–14, 221–22; plus two of the following: Phys 224, 225–26, 231, 233, 234, 243, 244.

The completion of a high-level computer language course with a grade of A or B is required for either option.

Doctor of Philosophy in the field of physics—Required: the general requirements stated under Columbian College of Arts and Sciences, including the following required courses: Phys 209–10, 211, 213–14, 221–22, 224, 225, 226 or 232, 231, 233–34 or 243–44.

Research fields: nuclear physics—experimental and theoretical studies on the structure, electromagnetic and strong interactions, and scattering of few-body systems at low and intermediate energies; solid-state physics—experimental and theoretical studies on high-T superconductors, molecular biophysics, magnetism, ultrasonic probing of electron scattering in solids, and surface physics; interdisciplinary physics, including radiation physics, applied physics, and biophysics.

Consent of a departmental graduate advisor is required for admission to all 200-level courses in physics.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

209–10 **Theoretical Methods in Classical and Quantum Physics** (3–3) Bennhold

Topics covered include solutions of partial differential equations encountered in physics; techniques of linear algebra; calculus of variations; complex analysis; applications in physics of the theory of analytic functions; integral equations; and group theory in physics.

211 **Advanced Mechanics** (3) Parke, Haberzettl

Analytic methods of mechanics as a basis for modern theory; variational principles, Lagrange's equations, Hamiltonian formulation, canonical transformations, classical perturbation theory. (Fall)

213–14 **Electromagnetic Theory** (3–3) Harper

Principles of electrostatics and magnetostatics with applications to the solution of boundary-value problems in electrically and magnetically active media. Maxwell's equations, time-varying fields, and plane-wave propagation. Radiating systems and scattering of radiation, including multipole fields. Dynamics of relativistic particles and radiation from moving charges. (Academic year)

221–22 **Quantum Mechanics** (3–3) Lee, Harper

General aspects of quantum mechanics with emphasis upon the developmental principles involved. Operators, representations, and transformation theory. Schrodinger and Heisenberg pictures, angular momentum, perturbation theory, scattering theory. (Academic year)

224 **Statistical Mechanics** (3) Zeng

Systematic development of classical and quantum statistics. Gibbs paradox, microscopic origins of entropy and other thermodynamic variables, fluctuations, ensemble theory, partition functions, distribution functions, density ma-

trices. Applications include the harmonic oscillator, magnetic systems, ideal Fermi-Dirac and Bose-Einstein systems, blackbody radiation, phonons.
(Spring)

- 225-26 **Graduate Laboratory (3-3)** Murphy, Feldman, Reeves
Phys 225: selected experiments on nuclear and solid-state physics; Phys 226: electronics. Laboratory fee, \$50 per semester. (Academic year)
- 231 **Quantum Field Theory I (3)** Parke
Local field theory and symmetry principles, field quantization, perturbation calculations, first-order electromagnetic and weak processes, divergence difficulties. (Fall)
- 232 **Quantum Field Theory II (3)** Lee
Covariant presentation of general theory of quantized fields, path-history quantization, theory of the S-matrix, dispersion relations, and renormalization program. (Spring)
- 233-34 **Nuclear Physics (3-3)** Harper, Briscoe, Haberzettl
Nuclear interactions, nuclear models, theory of nuclear reactions, pion physics, weak interactions, and electromagnetic interactions. (Academic year)
- 243 **Solid-State Physics: Structure and Binding (3)** Reeves, Peverley, Zeng
Crystal structure and binding; the reciprocal lattice, X-ray diffraction. Elastic properties, thermal, electric, optical and magnetic properties of solids, dislocations, and other defects. (Fall)
- 244 **Solid-State Physics: Electronic Properties (3)** Peverley, Reeves, Zeng
Electronic properties of solids; band theory, Fermi surfaces. Metals and semiconductors, transport phenomena including thermoelectric and magnetotransport effects, superconductivity. (Spring)
- 250 **Selected Topics in Physics (1 to 3)** Staff
Student presentations on advanced topics in physics. May be repeated for credit with permission of graduate advisor.
- 251 **Selected Topics in Theoretical Nuclear Physics (3)** Haberzettl, Bennhold
May be repeated for credit with permission of graduate advisor.
- 252 **Selected Topics in Experimental Nuclear Physics (3)** Berman, Briscoe, Feldman
May be repeated for credit with permission of graduate advisor.
- 253 **Selected Topics in Theoretical Condensed-Matter Physics (3)** Zeng
May be repeated for credit with permission of graduate advisor.
- 254 **Selected Topics in Experimental Condensed-Matter Physics (3)** Reeves
May be repeated for credit with permission of graduate advisor.
- 281 **Computational Mechanics (3)** Reeves, Dhuga
Topics include harmonic motion, celestial mechanics, chaotic systems, fluid dynamics, and other such complex systems that require a computational approach. Prerequisite: three semesters of undergraduate calculus and a complete sequence of calculus-based physics; working knowledge of C or FORTRAN. Laboratory fee, \$50. (Fall)
- 282 **Computational Electricity and Magnetism (3)** Haberzettl, Briscoe
Study of principles and observable consequences of electricity and magnetism with both numerical and graphical techniques applied to practical examples. Prerequisite: three semesters of undergraduate calculus and a complete sequence of calculus-based physics; working knowledge of C or FORTRAN. Laboratory fee, \$50. (Spring)
- 283 **Computational Modern Physics (3)** Parke
Modern physics and applications via computer modeling of relativistic and quantal systems; graphical visualization of such systems. Prerequisite: three semesters of undergraduate calculus and a complete sequence of calculus-based physics; working knowledge of C or FORTRAN. Laboratory fee, \$50. (Fall)
- 284 **Topics in Computational Applied Physics (3)** Maximon, Parke
Solution of problems taken from physics by implementing state-of-the-art computer programs: Monte-Carlo techniques, fast Fourier transforms, random-walk simulation, interpolation, and arbitrary precision. Prerequisite: university physics and three semesters of calculus; working knowledge of C or FORTRAN. Laboratory fee, \$50. (Spring)
- 291 **Seminar (1)** Staff
Lectures on current topics in physics. May be repeated twice for credit. (Fall and spring)

- 299–300 **Thesis Research (3–3)** Staff
 398 **Advanced Reading and Research (arr.)** Staff
 Limited to students preparing for the Doctor of Philosophy general examination.
 May be repeated once for credit.
 399 **Dissertation Research (arr.)** Staff
 Limited to Doctor of Philosophy candidates. May be repeated for credit.

POLITICAL MANAGEMENT

Professor F.C. Arterton (Dean)

Associate Professors D.W. Johnson, D. Anderson (Research), M. Cornfield (Research), R.K.

Roosevelt (Visiting and Interim Associate Dean), C.B. Cushman (Visiting)

Assistant Professor G. Lebel

Adjunct Professors M. Edwards, B. Rubin

Adjunct Associate Professors J. Hobson, J. Hall

Professorial Lecturers R. Behn, P. Fenn

Associate Professorial Lecturers M. Braden, T. Devine, R. Faucheux, W. Greener, E. Grefe,

R. Hoewing, N. Laird, E. Lazarus, D. Lowe, R. Thomas, B. Tringali, D. Walter

Assistant Professorial Lecturers R. Beckel, K. Schafer, D. McGroarty, J. Slade

Through the Graduate School of Political Management, Columbian College of Arts and Sciences offers the Master of Arts in the field of political management. Students focus their study on one of the following areas within political management: lobbying, corporate public affairs, campaign management, issues management, politics and public policy, fundraising, polling and strategic research, and political leadership.

Master of Arts in the field of political management—Prerequisite: a bachelor's degree from an accredited college or university; demonstrable interest or experience in politics; high academic standing.

Required: the general requirements stated under Columbian College of Arts and Sciences. The nonthesis program consists of 36 credit hours of course work; the thesis program consists of 30 credit hours of course work and 6 hours of thesis (PMgt 299–300). Students are required to complete a 400-hour internship of supervised political management activity. Students are required to take PMgt 201, 202, 207, 260, plus three courses in the chosen area of focus. Those in the nonthesis program must take PMgt 295.

- 201 **Fundamentals of Political Management (3)** Staff
 An introduction to the field of political management: historical and political analysis of Washington and its centers of power, lobbying and influence, issues and ideology, elections, and ethical considerations. Must be taken in the first semester of studies. (Fall and spring)
- 202 **Quantitative Methods for Political Managers (3)** Wiley
 Techniques of data analysis and the uses and abuses of statistical reasoning, with particular emphasis on applications to electoral campaigns, lobbying, and government relations. Topics include measurement, descriptive statistics, probability, and significance testing. (Fall, spring, and summer)
- 205 **Research and Data Collection (3)** Walter
 Evaluation of research information used by political managers to prepare position papers, analyze candidate records, buy advertising time, analyze constituencies, and target direct mail for canvassing, registration, and get-out-the-vote campaigns. (Spring)
- 206 **Speech Writing (3)** Staff
 Analysis and techniques of effective speech writing and speech presentation for public officials and candidates; emphasis on speech writing for campaigns and public policy forums. (Fall)
- 207 **Strategy and Message Development (3)** Cornfield, Fenn
 The specialized forms of communication that political professionals use to win public support for their candidates and policy positions. Message development: the art and craft of persuasion and the integration of research, strategy, tactics, and public feedback. (Fall, spring, and summer)
- 211 **Polling (3)** Staff
 Survey research uses in campaigns. Major objectives of surveys, designing and drawing samples, constructing and pretesting questionnaires, modes of interviewing, financial implications, practical problems in selecting and monitoring polling organizations, and interpretation of survey data. (Summer)

- 212 Political Management and the Media (3)** Greener
Organization, practices, and norms of the major media; media coverage of public officials, political campaigns, legislative battles, interest groups, and issues of public policy. Formulation of strategies for getting favorable news coverage for the issue or candidate and for ending a media crisis. (Spring)
- 214 Qualitative Research in Political Management (3)** Tringali
Uses and usefulness of focus groups and small-sample interviews; procedures involved in these techniques; implications of psychological and sociological theory; relationship of qualitative and quantitative research. (Spring)
- 217 Advanced Computer Applications in Politics (3)** Staff
Advanced desktop publishing, database management, on-line information retrieval from commercial databases, electronic mail systems, and rudiments of multimedia production and data-mapping software. (Summer, odd years)
- 218 Politics and the New Media (3)** Cornfield
Use of new media in communications between politicians and citizens, effects on political rhetoric, and quality of communications in contemporary politics. (Summer)
- 220 Fundraising (3)** Staff
Raising and spending money in political campaigns, referenda contests, issue politics, and lobbying efforts. Budgeting, control of expenditures, accounting procedures, and general strategies for fundraising. (Summer)
- 221 Fundraising for Organizations (3)** Staff
Advanced techniques of fundraising for established political organizations. Long-range financial stability for organizations, including membership strategies, direct mail, telemarketing, and special events. (Spring)
- 222 Executive Fundraising (3)** Hall
The business and techniques of fundraising for charitable, trade association, semi-private, and public institutions. (Fall)
- 230 Lobbying (3)** Hobson
How lobbying and organized advocacy fit into the American political process and development and implementation of advocacy strategies. Lobbying by business, labor, public interest groups, and other nonprofit organizations; lobbying within and among various branches of government. (Fall and spring)
- 231 Lobbying the Budget Process (3)** Edwards
Politics of the budget process, using case studies from recent federal budget cycles. Formal and informal mechanisms of budgeting, the lobbying strategies employed by private and public organizations seeking to influence budgetary decision making, and negotiations within and between executive agencies. Prerequisite: PMgt 230. (Summer)
- 232 Managing Government Relations Programs (3)** Staff
Organizational models and techniques used by corporations and business associations to influence the development of public policy at federal, state, and local levels, as well as internationally. (Spring)
- 233 Grassroots Politics (3)** Grefe
Lobbying and advocacy strategies and techniques at the local level. Use of grassroots lobbying by corporations, labor unions, civic and nonprofit organizations, and special interest groups. (Spring)
- 234 International Lobbying (3)** Staff
Examination of the current state of international lobbying and analysis of strategic models. (Spring)
- 236 Corporate Public Affairs (3)** Staff
Exploration of major functional areas in public affairs, with focus on political and policy dynamics. (Fall)
- 237 Advanced Lobbying Strategy (3)** Lowe, Slade
Current case studies of major policy initiatives; simulation of roles of participants in lobbying campaigns, strategies integrating issue research, qualitative and quantitative analysis. Prerequisite: PMgt 230 or 231. (Fall and summer)
- 240 Campaign Management (3)** Devine, Faucheux
Orientation to the basic systems that must be managed to produce electoral victory. Importance of the campaign plan and campaign budget as techniques of management. (Fall and spring)
- 241 Campaign Advertising and Promotion (3)** Fenn
Strategies for the use of the various media in political campaigns, with an emphasis on television and the development of campaign messages; production,

- timing, and placement of television advertising. Students design print ads and brochures and produce a 30-second television spot. Laboratory fee, \$200. Prerequisite: PMgt 240. (Spring)
- 242 **Campaign Organization (3)** Lebel
Choices facing the campaign manager: assessment of the candidates, making the decision to run, fundraising, geographic and demographic targeting, field organization, canvassing, phonebanks and get-out-the-vote, press operations, financial control, and relations with the party and interest groups. Prerequisite: PMgt 240. (Spring)
- 243 **Strategic Factors in Presidential Campaigns (3)** Staff
Presidential campaign strategy: campaign organization, fundraising, primaries and caucuses, delegation selection rules, party conventions, national and state party organizations, and the general election.
- 244 **International Political Consulting (3)** Johnson
Advanced seminar focusing on professionalization of elections and modern campaign techniques. (Spring)
- 246 **Political Communications Strategy (3)** Walter
The role of the communications director. Message development and implementation of a coordinated communications strategy. Integration of paid and free media coverage. (Summer)
- 247 **Advanced Campaign Strategy and Management (3)** Staff
Strategy, tactics, and management of campaign research, polling, message formulation, and media. Prerequisite: PMgt 240. (Fall and summer)
- 250 **Issues Management (3)** Rubin
Management of public policy issues, rise of referenda and citizen initiatives, proliferation of issue-oriented campaigns directed at the grassroots. How individuals and interest groups participate in the issue advocacy process and the evolving role of political and campaign managers in issue campaigns. (Fall and spring)
- 251 **Public Opinion Dynamics (3)** Wiley
Processes by which citizens make decisions about political issues and consider the range of methods for influencing those decisions. Public opinion polling, voter behavior studies, communications, media studies, and attitudinal change. (Summer)
- 252 **Crisis Management (3)** Edwards
Management of crisis situations and "defining moments" in electoral, legislative, and public policy campaigns. Through the use of simulation exercises and recent case studies, the course explores both the theoretical and practical aspects of crisis management. (Fall)
- 254 **Referendum Politics (3)** Staff
Managing the politics of initiative petitions and referendum elections to establish public policy. (Spring, odd years)
- 257 **Strategic Management of Political Issues (3)** Grefe
Case studies of major current policy questions. Development of strategy and message development integrating research, polling, and focus group analysis. (Fall and summer)
- 260 **Ethics and Political Management (3)** Anderson
Application of ethics to political campaigning, lobbying, and representation generally; norms of conduct that should guide activities and working relations of candidates, campaign consultants, polling organizations, political reporters, lobbyists, legislators, and officials. (Fall, spring, and summer)
- 262 **Law of the Political Process (3)** Braden
Legal and constitutional framework for political process, including ballot access, voter registration, and laws governing political parties and political organizations, campaign finance, political broadcasting, lobbying registration, and ethics in public service. (Summer)
- 265 **Special Topics (3)** Staff
Topic to be announced in the *Schedule of Classes*.
- 266 **Budgetary Policy (3)** Staff
Analysis of U.S. monetary and fiscal policy. Off-campus only. (Spring)
- 267 **Budgetary Politics (3)** Staff
Examination of federal budget policymaking and politics. Off-campus only. (Fall)

- 280 Leadership and Politics (3)** Staff
Leadership in the political realm in comparison to the corporate and nonprofit sectors. (Spring)
- 281 Running for Office (3)** Faucheux
Electoral politics from the perspective of the candidate, strategic and personal factors involved in the decision to run, consequences of victory or defeat. (Summer)
- 282 Leadership in Public Office (3)** Staff
How elected officials must govern while balancing electoral support and policy perspectives. (Spring)
- 290 Independent Study (3 to 6)** Staff
- 295 Advanced Problems and Strategy (3)** Arterton
Capstone seminar that integrates research skills and political techniques required to define political objectives and develop the appropriate strategies to accomplish such objectives. Students must have completed 24 credit hours to enroll in this course. (Fall, spring, and summer)
- 299-300 Thesis Research (3-3)** Staff
Master's degree candidates must apply to the program committee for thesis approval and have completed 24 credit hours with a 3.3 GPA.

POLITICAL PSYCHOLOGY

Professor J.M. Post

The Elliott School of International Affairs offers a course sequence (which may lead to a graduate certificate) in political psychology.

- 201 Fundamentals of Political Psychology (3)** Post
A review of the interdisciplinary field of political psychology; examination of psychological influences on political behavior at the level of the individual and small group; the psychology of leader-follower relationships; crisis decision making. (Fall)
- 202 Political Psychology Research Methods (3)** Staff
Major research methods of political psychology, using classic articles in the field. Both quantitative methods, such as survey research and content analysis, and qualitative methods, such as personality profiling and comparative case studies, are considered. Prerequisite: PPsy 201. (Fall)
- 203 Public Opinion and Political Socialization (3)** Staff
Same as PSc 220.
- 204 Theory and Practice of International Negotiations (3)** Staff
Same as IAff 204.
- 205 Political Violence and Terrorism (3)** Post
The origins and the sociopolitical and behavioral dynamics of political violence and terrorism. Major types of terrorism are differentiated. Implications for anti-terrorist policy. The psychology of hostages. (Spring)
- 291 Applied Political Psychology (3)** Post
Seminar and practicum in applications of political psychology. Prerequisite: PPsy 201. (As arranged)
- 295 Independent Study and Research (1 to 3)** Post
Supervised research in a special topic in political psychology. Preparation of major research paper. Prerequisite: PPsy 201, 202. (As arranged)

POLITICAL SCIENCE

University Professor J.N. Rosenau

Professors B. Reich, J.M. Logsdon, H.R. Nau, M.A. East, J.B. Manheim, C. McClintock, P. Reddaway, J.R. Henig, L. Sigelman (*Chair*), M.J. Sodaro, S.L. Wolchik, H. Harding, D. Shambaugh, C.J. Deering, H.B. Feigenbaum, N.J. Brown, H.L. Wolman

Associate Professors R.W. Rycroft, J.H. Lebovic, R.P. Stoker, A. Bowie, S.K. Sell, M. Finnemore, F. Maltzman, J. Goldgeier, D.D. Avant, B. Dickson, P. Wahlbeck, L. Zeng, M.M. Mochizuki, S.J. Balla, S. Binder, S. Wiley

Assistant Professors I. Creppell, J. Willson-Quayle, J.M. Smith, D. Dassa Kaye, P. Brewer, R. Austin, E.Z. Csargo, W.J. Winstead

Master of Arts in the field of political science—Prerequisite: a bachelor's degree from an accredited college or university, or an equivalent degree, and high undergraduate scholastic standing.

Required: The general requirements stated under Columbian College of Arts and Sciences, a research tool, and a general examination in a primary field. The research tool may be reading knowledge of a modern foreign language, a specified level of knowledge in statistics, or two graduate-level courses in a cognate discipline. Students prepare for general examinations by taking at least six courses selected according to departmental guidelines in their chosen field. Five fields of concentration are available: American politics and government; international relations; comparative and foreign politics; political theory; and public policy. Students are required to take at least two courses outside of their primary field of concentration. Students may elect one of the following programs: (1) 30 credit hours of graduate course work, including PSc 299–300, and the satisfactory completion of a master's thesis; or (2) 33 credit hours of graduate course work without a thesis.

Doctor of Philosophy in the field of political science—Students of outstanding ability are admitted to the doctoral program upon recommendation of a departmental graduate committee and the concurrence of the Columbian College.

Required: The general requirements stated under Columbian College of Arts and Sciences, two research tools, a General Examination covering both a primary and secondary field, and a dissertation demonstrating the capacity to undertake original and significant research. The research tools may be selected from reading knowledge of a modern foreign language, a specified level of knowledge in statistics, or two graduate-level courses in a cognate discipline. Students prepare for the General Examination by taking at least six courses in their primary field and at least four courses in their secondary field, selected according to departmental guidelines. Four primary fields are available: American politics and government; international relations; comparative and foreign politics; and public policy. In addition, political theory and research methodology are available as a secondary field.

All students must complete a sequence of courses in research methodology comprising PSc 201 and either PSc 202 or 209. Students may opt to take all three. Completion of PSc 202 with a grade of B or higher will be taken as evidence that a student has achieved the level of knowledge in statistics necessary to satisfy one of the research tool requirements as outlined above.

General examinations are given three times per year. Students may take both their primary and secondary field examinations during the same testing period, or they may take them in successive semesters. The examination in the primary field entails both a written and oral component.

A recommendation to the dean for admission to candidacy, or the dissertation research stage, will be considered upon satisfactory completion of all course work, tool requirements and field examinations. Students must pass their primary field examination with a satisfactory pass or higher and must pass their secondary field examination with a bare pass or higher in order to be considered eligible for promotion to candidacy. Admission to candidacy is permitted only if the student's performance on the examinations and in the course work gives a good indication of success in the second unit. Passing the field examinations does not in itself ensure admission to candidacy.

The dissertation prospectus must outline the central research question(s), relate the proposed research to the existing literature, detail a research methodology, and explain the nature of the original contribution that the completed project will provide. The prospectus must be presented and defended in an open forum, which all faculty and doctoral students are invited to attend.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201 Introduction to Political Analysis (3)

Alternative approaches to political analysis, construction of research designs, and problems of measurement. Laboratory fee, \$20. (Fall and spring)

202 Empirical Political Analysis (3)

Techniques of social science data analysis, with emphasis on statistics and computer applications. PSc 201 or other previous introductory research training is highly desirable. Laboratory fee, \$20. (Spring)

Wahlbeck, Zeng

Wahlbeck, Zeng

- 203 **Approaches to Public Policy Analysis** (3) Stoker, Balla
Empirical and normative foundations of systematic policy analysis: concepts, theories, models, issues, strengths, limitations, and uses and misuses in the policy process. (Fall)
- 205 **Readings in Political Theory** (3) Creppell
Selected major works, both ancient and modern, that illuminate basic problems and questions of political theory. (Fall)
- 206 **Topics in Political Theory** (3) Creppell
Advanced readings and group discussions. Analysis and interpretation of selected concepts and schools of thought. (Spring)
- 207 **Modern Political Thought and Ideologies** (3) Staff
Analysis of some main currents in modern political thought and ideologies. (Fall)
- 208 **Russian Political Thought** (3) Staff
Analysis of contemporary Russian political thought and its antecedents. (Spring)
- 209 **Systematic Inquiry and Research Design** (3) Avant, Deering
Study design, data collection, and models of analysis in political science.
- 210 **American Political Process** (3) Deering, Maltzman
A survey of American political institutions, processes, and behavior. (Fall)
- 211 **State and Urban Politics** (3) Henig
Comparative analysis of the context, institutions, processes, and policies of state and urban political systems. (Alternate years)
- 212 **State and Urban Policy Problems** (3) Henig
Analysis of public policy issues confronting state and urban governments; emphasis on the theoretical roots and empirical impact of past and present programs in such areas as housing, education, poverty, and crime. (Alternate years)
- 213 **Judicial Politics** (3) Wahlbeck
Introduction to the literature of judicial process and behavior studies; specific focus on selected topics. Emphasis on the major subfields of law, courts, and judicial process.
- 215 **Judicial Policymaking** (3) Wahlbeck
Role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues.
- 217 **Executive Branch Politics** (3) Rycroft, Balla
Structure and operation of governmental bureaucracy with particular emphasis on the politics of formulating and implementing public policy.
- 218 **Legislative Politics** (3) Deering, Maltzman, Binder
Theory, structure, and process of the U.S. Congress, with emphasis on member-constituency relations, individual and collective decision making, party and committee activities, executive-legislative relations, and interest-group activities.
- 219 **American Political Parties and Elections** (3) Binder
Nature and functions of American political parties: organizational status, nominating and electoral politics, and role in governing. (Alternate years)
- 220 **Public Opinion and Political Socialization** (3) Brewer
Sources and dynamics of public opinion and political socialization. Same as PPSy 203.
- 221 **Interest-Group Politics** (3) Deering, Wright
Theory, structure, and activities of interest groups in American politics.
- 222 **Executive-Legislative Relations** (3) Staff
Political and institutional relationships between the executive and legislative branches of the federal government. Offered off campus only.
- 224 **Domestic Policy Analysis—Selected Topics** (3) Balla
Analysis of U.S. policy toward selected domestic problems.
- 228 **Media and Politics** (3) Staff
Role of the media in American politics, with emphasis on television news coverage, political debates, political advertising, and their impact on the electorate.
- 229 **Politics and Public Policy** (3) Stoker, Henig, Balla
Examination of political processes that influence policy formulation, policy implementation, and the uses of policy analysis.

- 230 **Comparative Government and Politics (3)** McClintock, Dickson, Bowie
Examination of basic approaches to comparative politics. (Fall and spring)
- 231 **Advanced Theories of Comparative Politics (3)** Feigenbaum
Advanced theories in comparative politics.
- 232 **Communism and Democratization (3)** Sodaro
Comparative analysis of transitions to democracy in communist and postcommunist systems, with applications of democratic theory. (Fall)
- 233 **Comparative Post-Communist Systems (3)** Reddaway
How the government and politics of the 15 successor states of the Soviet Union have evolved since they became independent in 1991. An attempt to understand how and why their governmental systems have come to vary from partially consolidated democracies to one-man dictatorships. (Spring)
- 234 **Democracy and Democratization in Comparative Perspective (3)** Brown, Dickson, McClintock, Sodaro
The origins of democratic systems and their operations. Recent cases of democratization are considered, along with historically older democracies.
- 235 **The Politics of Industrialization (3)** Bowie
Comparative analysis of politics as it has affected and been affected by the process of industrialization, with special attention to the economies of Latin America and East and Southeast Asia. Cross-regional comparison of processes of industrialization and development. (Fall, alternate years)
- 236 **The Political Economy of Developing Areas (3)** Bowie
Comparative analysis of how development problems have been defined from both political and economic perspectives and the solutions proposed by outsiders and insiders. Emphasis on the rise and fall of development orthodoxies. (Spring)
- 237 **Theories of Political Development (3)** Feigenbaum
Examination of how and why political systems develop the way they do. Why do some countries develop into democracies, while others become authoritarian? How do class conflict, the nature of the elite, and the political culture affect the development of political institutions? (Spring, alternate years)
- 238 **U.S. Foreign Economic Policy (3)** Nau
Exploration of ideas and issues involved in U.S. foreign economic policy, including relationship of economic and security issues, interdependence, protectionism, role of the dollar, industrial policy, and the debt crisis. (Fall)
- 239 **International Political Economy (3)** Sell, Nau
Research seminar exploring alternative theoretical approaches to the study of international political economy and their application to the explanation and interpretation of historical and contemporary events in world political and economic affairs. (Spring)
- 240 **International Politics (3)** Lebovic, East, Nau
Open to Elliott School students only. Theories of international relations. (Fall)
- 241 **Advanced Theories of International Politics (3)** Sell
Advanced theories of international relations. (Fall)
- 242 **Politics and Practice of International Institutions (3)** Finnemore
The politics of international institutions in the areas of collective security, peace keeping, trade, money, development, environment, human rights. (Fall)
- 244 **Politics of International Law (3)** Smith
The political sources and consequences of international law and norms. (Fall)
- 245 **Comparative Foreign Policy (3)** East, Auerswald
The relationship of international actors with one another and with their external environment analyzed in a comparative framework. Focus on nation-states as well as non-state actors, such as international organizations. Differences and similarities in policies on economics, diplomacy, security, and global issues. (Spring)
- 246 **U.S. Foreign Policy (3)** Auerswald
Patterns and problems in contemporary U.S. foreign policy. Special attention given to the domestic political factors shaping foreign policy.
- 247 **U.S. Foreign Policy After the Cold War (3)** Auerswald, Nau
Contemporary debate about the substance of American foreign policy in the post-Cold War world through the lens of alternative theoretical approaches to

the study of international relations. Classical realist (national interest), neo-realist (balance of power), neoliberal (international interdependence and institutions), and constructivist (national identity) interpretations are compared.

- 248 **Politics of U.S. National Security Policy** (3) Auerswald, Avant
Examines competing theoretical approaches to the study of national security policy and tests these on a variety of substantive issue areas in the United States. (May include such topics as nuclear non-proliferation, responses to regional conflicts, definition of new security goals, etc.)
- 249 **International Security Politics** (3) Avant, Goldgeier
The major theoretical debates in the field of international security. Topics include the causes of war, civil-military relations, deterrence, arms control, alliance formation, crisis management, technological dependence, ethnicity, migration, and environmental degradation.
- 250 **Foreign Policy Analysis—Selected Topics** (3) Staff
Analysis of U.S. foreign policy toward selected world regions.
- 251 **Civil-Military Relations** (3) Avant
Substantive and theoretical issues and debates in the study of civil-military relations. (Spring, alternate years)
- 252 **Theories of International Security** (3) Avant
Focus on conflict in different systems and scenarios and on causes and consequences of different strategies. The role of ethics in international security. Primarily for doctoral students.
- 253 **Advanced Theories of International Political Economy** (3) Smith
Core readings in international political economy and debates regarding methodological approaches. Primarily for doctoral students. Prerequisite: PSc 239.
- 257 **Arms Control and Disarmament** (3) Staff
Major issues and trends in the postwar development of U.S. arms control and disarmament policy. (Spring)
- 260 **Western European Politics** (3) Feigenbaum
Examination of the principal characteristics of the British, French, German, and Italian political systems, comparing their institutional and behavioral adaptations to the problems of advanced industrial democracies. (Fall)
- 261 **Politics of European Integration** (3) Sodaro
The origins, institutions, and politics of West European integration, with emphasis on theories of regional integration and the development of the European Union.
- 262 **The Political Economy of Advanced Industrial States** (3) Feigenbaum
An examination of the relationship between economics and politics in areas such as political development, trade, and monetary policy. (Spring)
- 263 **Russia and Europe** (3) Sodaro
Russia's role in post-Cold War Europe, focusing on economic and security relations throughout the region and on domestic-foreign policy linkages in the former USSR, Eastern Europe, and Western Europe. (Fall)
- 264 **Comparative Governments and Politics of Eastern Europe** (3) Wolchik
Comparative analysis of domestic political processes and policies in Eastern Europe. (Fall)
- 265 **The International Politics of Eastern Europe** (3) Wolchik
Major historical, political, social, and regional factors that have shaped the interwar, World War II, and postwar evolution of Eastern Europe; emphasis on foreign relations with outside powers and on regional East-West contacts. (Spring)
- 266 **Government and Politics of the USSR** (3) Reddaway
Seminar on Soviet domestic government and politics, treated historically (1917-1991). (Fall)
- 268 **Post-Soviet Foreign Policies** (3) Staff
External problems and policies of Russia and the other successor states of the former USSR (especially the Baltics, Ukraine, and southern rim of the former Soviet Union). (Spring)
- 270-71 **Politics of China** (3-3) Dickson, Shambaugh
PSc 270: Readings and discussion of the political dynamics and policy process in contemporary China. PSc 271: Research seminar on selected topics in Chinese politics, using official and other primary sources. Prerequisite to PSc 271: PSc 270 or permission of instructor. (Academic year)

- 272 Foreign Policy of China (3)** Shambaugh, Harding
Readings and research on the main approaches to analyzing China's foreign policy and foreign relations. (Spring)
- 273 The Political Economy of Asia (3)** Bowie
Comparative analysis of the relationship between economic interests and politics in East and Southeast Asia. Emphasis on capitalist economies and their integration into global trade and investment networks. (Fall, alternate years)
- 274 Governments and Politics of Japan and Korea (3)** Staff
Readings and research on the domestic and foreign policies of Japan and North and South Korea. (Fall or spring)
- 275 International Politics of East Asia (3)** Harding, Mochizuki, Shambaugh
Foreign policies and international behavior of the regional states (especially China, Japan, and Vietnam) and the extraregional powers (especially the U.S. and Russia). (Spring, odd years)
- 276 The Arab-Israeli Conflict (3)** Reich
Readings and research on the origins, evolution, and issues of the Arab-Israeli conflict. (Spring)
- 277 Comparative Politics of the Middle East (3)** Reich, Brown
Readings and research on selected problems of the governments and politics of the Middle East. (Fall)
- 278 International Relations of the Middle East (3)** Reich, Brown
Readings and research on the regional and international relations of the Middle East. (Spring)
- 279 The Powers in the Middle East (3)** Reich
The role of the powers in the Middle East, with emphasis on the policies of the United States and the Soviet Union. Consideration is given to other major European and Asian powers. (Fall)
- 283 Comparative Politics of Latin America (3)** McClintock
Readings and discussion on the politics of selected countries in South America, Central America, and the Caribbean. Emphasis on the possibilities for democracy and revolution. (Fall)
- 284 International Relations of Latin America (3)** McClintock
Readings and discussion on U.S.-Latin American relations and the foreign policies of selected states. (Spring)
- 285 Selected Topics in Empirical Analysis (3)** Zeng
Advanced techniques of data collection and analysis; varying emphasis on such methods as causal modeling, analysis of variance, regression analysis, and simulation. (Offered as the demand warrants)
- 286 Selected Topics in American Politics (3)** Staff
In-depth coverage of significant theoretical and empirical issues in American politics, including such topics as political behavior, electoral politics, and race and politics. For advanced students. (Offered as the demand warrants)
- 287 Selected Topics in Political Theory (3)** Staff
In-depth coverage of significant issues in political theory, including such topics as justice, toleration, and political community. For advanced students. (Offered as the demand warrants)
- 288 Selected Topics in Comparative Politics (3)** Staff
In-depth coverage of significant theoretical and empirical issues in comparative politics, including such topics as democratization, the politics of development, the role of the state in advanced industrial societies, gender and ethnicity, and the politics of nationalism. (Offered as the demand warrants)
- 289 Selected Topics in International Politics (3)** Staff
In-depth coverage of significant theoretical and empirical issues in international politics, including such topics as comparative foreign policy, ethics and norms in international politics, the politics of military intervention, and theories of security in a post-Cold War environment. For advanced students. (Offered as the demand warrants)
- 297 Reading (3)** Staff
Limited to master's degree candidates. Written permission of instructor required.
- 298 Research (3)** Staff
Limited to master's degree candidates. Written permission of instructor required.

- 299-300 **Thesis Research (3-3)** Staff
 397 **Advanced Reading (3)** Staff
 Limited to students preparing for the Doctor of Philosophy general examination.
 May be repeated for credit.
 398 **Advanced Research (arr.)** Staff
 Limited to students preparing for the Doctor of Philosophy general examination.
 May be repeated for credit.
 399 **Dissertation Research (arr.)** Staff
 Limited to Doctor of Philosophy candidates. May be repeated for credit.

PROFESSIONAL PSYCHOLOGY

Professors J.C. Miller (*Director*), D.E. Holmes, L.J. Ingraham
Associate Professors P.A. Jennings, R.C. Fritsch, C.E. Parks
Assistant Professors M.D. Jasnow, Y.E. Alechina, J.A. Kassett, E.C. Klosson
Assistant Professional Lecturers E.B. Fritsch, K.R. Miller, M.L. Wylie, D.E. Cooper, E.W. Baughman, B.P. Jones, A. Nover, J. Hanback

Clinical Training Staff

Clinical Professor J. Borriello

Assistant Clinical Professors M. Harris, P.L. Ellman, Q. Graham, C. Verghese

Through the Center for Professional Psychology, Columbian College of Arts and Sciences offers the degree of Doctor of Psychology.

Doctor of Psychology in the field of clinical psychology—Prerequisite: the degree of Bachelor of Arts with relevant background and experience in psychology or its equivalent. Students who lack adequate preparation will be expected to complete prerequisite undergraduate courses during the first year of the program; credit for such courses does not apply to the degree.

Required: the general requirements stated under Columbian College of Arts and Sciences. The three-year program includes the core curriculum (PsyD 201-2, 204, 205, 206, 207, 209, 220-21, 225-26, 227, 244); seven courses chosen from two tracks—four from a designated major and three from a designated minor—as indicated in the listing of tracks below; satisfactory completion of the General Examination in the core and major areas of study; and the completion of the practicum seminar (PsyD 203) for each of the nine semesters of the program.

In addition, successful completion of an externship—a year-long, part-time supervised clinical assignment—is required in each year of the program. A failed externship may, in exceptional circumstances and with the approval of the program director, be repeated. If the student fails a second time, no further opportunity will be provided, and the student's degree candidacy is terminated.

A one-year, full-time internship at an institution approved by the program faculty is required for completion of the degree program. If the student fails the internship, no further opportunity will be provided, and the student's degree candidacy is terminated.

Tracks: Psychodynamic psychotherapy (the PsyD 230s), community psychology (240s), diagnostic assessment (250s), child therapy (260s).

Note: PsyD courses are limited to students enrolled in the Center for Professional Psychology except by permission of the director. See the Department of Psychology for the degree program leading to the Doctor of Philosophy in the field of clinical psychology.

201-2 Psychological Assessment (3-3)

Cognitive and projective testing, focusing on core batteries used in intellectual and personality assessment. Laboratory fee, \$30 per semester.

203 Practicum in Clinical Psychology (1 to 3)

A continuing practicum, repeated in each semester and summer of the program's three years. One credit each in the fall and spring, three credits in a summer session. In year one, focused on psychological assessment; in upper years, on psychological intervention related to the student's choice of tracks.

204 Biological Basis of Clinical Psychology (3)

The structure and function of the nervous system and its application to understanding psychopathology. Development of the nervous system in interaction with learning and experience as a central basis of human growth and disability.

205 Psychodynamic Psychopathology (3)

The developmental psychodynamic basis for understanding psychopathology, with comparisons to relevant biological and social explanatory factors.

- 206 Cognitive Basis of Clinical Psychology (3)**
The theoretical and experimental basis of learning, memory, and cognition. Cognitive growth, maturation, and learning. Cognitive development in relation to adaptive and maladaptive resolution of conflict.
- 207 Group and Organizational Dynamics (3)**
Social aspects of adaptive and maladaptive dynamic patterns; group structure and the individual; shared unconscious ideas in wish and defense; small, large, and intergroup (community) dynamics and intervention.
- 209 Statistics and Research Design (3)**
The role of measurement, design, and statistics in clinical psychological research; basic descriptive and inferential statistics; analysis of variance and multivariate designs; case study designs; clinical field research; process analysis.
- 210 Professional Issues (3)**
The legal and ethical issues in the conduct of professional psychology, including confidentiality, ethical competence, privilege, expert testimony, malpractice, and the insanity defense. Business and ethical issues concerning private practice, licensing, certification, forensics, and insurance reimbursement.
- 215 Adolescence (3)**
The unique characteristics of the adolescence phase—normal development, psychopathology, and treatment approaches. Treatment of the severely disturbed adolescent.
- 220–21 Psychodynamic Psychotherapy (3–3)**
A one-year course on psychodynamic theory, technique, and research relating to individual psychotherapy. Readings in Fenichel, Brenner, Kohut, Klein, Perls, Rogers. Recent developments in theory and technique. Professional ethics.
- 222 Behavioral–Cognitive Therapies (3)**
Theoretical and clinical approaches to understanding and modifying behavior, affect, and thought from behavioral and cognitive perspectives. History and development of these perspectives; current work on psychotherapy integration across varying therapeutic approaches.
- 225 Ego Psychology (3)**
An introduction to modern ego psychology: from Freud and Hartmann to Anna Freud, Brenner, Sandler, Abend, Arlow.
- 226 Object Relations Theory (3)**
A historical survey of object relations theory, from Klein, Fairbairn, Winnicott to Bion, Kernberg, Mahler, Jacobsen, Kohut.
- 227 History and Systems of Clinical Psychology (3)**
A review of the historical development of clinical psychology; its roots in mainstream psychology and psychiatry; its modern technical and theoretical systems.
- 230 Recent Developments in Technique (3)**
Current topics and controversies in psychotherapy technique. Readings in Gill, Ross, Brenner, Arlow, Gray, Schwaber, Stone, Etchegoyen.
- 231 Short-Term Psychotherapy (3)**
A study of brief psychodynamically oriented psychotherapy interventions. Focus on clinical vignettes; readings in Werman, Davanloo, Sifneos, and others.
- 232 Character Pathology: Theory and Technique (3)**
Recent contributions to the understanding of character pathology and its implications for treatment. Readings in Kernberg, Kohut, Abend, Porder and Willick, Klein, Bion, Winnicott.
- 233 Issues in Gender Development (3)**
Studies of similarities and differences in male and female gender development. Recent theoretical and clinical contributions. Writings of Stoller, Blum, Tyson and Tyson, Galenson and Roiphe, Kleeman, Chassaguet-Smirgel.
- 234 The Nature of Therapeutic Action (3)**
How therapy works to bring about change. The function of affect. The role of fantasy and the process of working through. Conflict and compromise in adaptive and maladaptive functioning.
- 240 Group Psychotherapy (3)**
Theory and technique in group psychotherapy: history of group therapy and group analysis; current controversies in the field. Readings in Bion, Eziel, Scheidlinger, Whitaker, Foulkes, Pines, Anzieu, Ganzarain.

242-43 Psychology and Law (3-3)

The psychological study of the legal process and the application of psychodynamic principles and findings in the legal process. Studies and intervention in the judicial and correctional systems; judge and jury studies; psychological testimony, corrections research and reform; working with special forensic systems and populations.

244 Cultural Factors in Psychopathology and Psychotherapy (3)

The study of cultural forces as both cause and effect variables in psychopathology and psychotherapy. Cultural factors in resistance and transference. Readings in Kardiner, Srole, Dollard, Lerner, Holmes, Fischer.

245 Advanced Group and Organizational Dynamics (3)

For students interested in learning to conduct research or engage in consultation in groups and organizations. Advanced techniques of diagnosis, clarification, and interpretation.

246 Community Intervention (3)

Theory and research in community mental health intervention. Work with community organizations on local projects. Readings in Sarason, Goldenberg, Miller et al., Levinson, Kaplan.

250 Neuropsychological Assessment (3)

Theory and practice of neuropsychological assessment. History and development of the field. Major batteries, individualized approaches, and specialized tests.

251 Advanced Psychodynamic Assessment (3)

Recent trends in projective testing; Lerner and Lerner, Schafer, Allison and Blatt, Kwawer, Sugarman, Exner.

252 Child and Adolescent Assessment (3)

Case seminar with clinical presentations, focused on the core clinical battery. Problems of differential diagnosis between neuropsychological hypotheses and conflict-based hypotheses. Readings in Siegal, Ames, Rothstein, Rabin and Rabin, Havworth, Sattler.

255 Forensic Assessment (3)

Overview of the professional standards and ethics guidelines for forensic evaluations. The psychological assessment of criminal cases, the role of the psychologist in expert testimony, and concepts and principles of law encountered in the forensic evaluation process. The role of theory and research in the criminal evaluation process.

260 Child Development (3)

Cognitive and emotional factors in the development of normal and abnormal personality dynamics in children and adolescents: experiential and maturational aspects, learning disabilities, the development of conflict and compromise formations; the relevance of child development to adult psychodynamics and psychotherapy.

262 Child and Adolescent Psychopathology (3)

Theory and research on child and adolescent psychopathology. The development of diagnostic categories and their relevance to psychodynamic viewpoints. Readings in Klein, A. Freud, Yorke, Sandler and Sandler, Greenspan, Stern, Mahler, Blos, Tyson and Tyson, Neubauer, Nagera.

264 Child and Adolescent Psychotherapy (3)

Case seminar on child and adolescent treatment. Biological and psychological treatments; intensive vs. short term; conceptualizations of play therapy; differences from adult techniques. Readings in Sandler, Tyson and Kennedy, A. Freud, Glenn.

265 Family Therapy (3)

Survey of classical and modern theories of family structure and therapy. History and development of the field. Major schools and current controversies. Readings in Whitaker, Ackerman, Palazzoli, Bowen, Framo, Haley, Hoffman, Satir, Slipp.

266 Clinical Intervention in Schools (3)

Theory and practice of clinical psychological interventions in schools. Testing, observation, consultation. Readings in Newman, Sarason, Goldenberg, Kaplan.

267 Advanced Child Psychotherapy (3)

Technical approaches to selected clinical problems and populations. Topics include trauma, physical and sexual abuse, problems in learning and attention, gender identity disorder, behavior problems, adoption, divorce, and working

with borderline children. Understanding and interpreting the child's play, coordination of developmental and therapeutic processes, and collateral work with parents.

270 Current Topics in Clinical Psychology (arr.)

May be repeated for credit provided the topic differs.

271 Independent Study (arr.)

PSYCHOLOGY

Professors E. Abravanel, J. Miller, L.A. Rothblat, R.A. Peterson (*Chair*), P. Wirtz, D. Reiss, C.K. Sigelman, G. Howe (*Research*), L.R. Offermann, P.J. Poppen

Associate Professors L. Brandt, C.A. Rohrbeck, M.C. Zea, S. Dopkins, S.D. Molock, J.M. Ganiban, D.P. Costanza, E. Davis

Assistant Professors N. Frank, P.J. Moore, C. Beil (*Research*), N. Vasilopoulos, J.W. Philbeck, D.E. Schell, C. Gee, N. Le, A.N. Zucker

Adjunct Assistant Professor K. Ross-Kidder

Clinical Training Staff

Associate Clinical Professors D.M. DePalma, R.L. Jenkins

Assistant Clinical Professors L.E. Moldauer, C. Verghese, M.B. Kaiser, R. New, H.S. Lovett

Doctor of Philosophy in the field of psychology—Prerequisite: the degree of Bachelor of Arts with a major in psychology. Students whose academic preparation is in other disciplines will be expected to complete prerequisite undergraduate courses to prepare for graduate study in psychology before admission to the field.

Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) Psyc 202, two graduate psychology courses outside the chosen field and approved by the advisor, and appropriate statistics courses; and (2) the satisfactory completion of a first-year examination and the General Examination in the major area of study. For detailed requirements, consult the chair of the department or the chair of the doctoral program committee.

Fields: clinical, cognitive neuropsychology, industrial-organizational/applied social psychology.

Courses at the 200 level are limited to graduate students in psychology, except by permission of instructor. With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 202 Psychological Research Methods and Procedures (3)** Vasilopoulos
Required in all graduate psychology programs. Includes philosophy of science, types of research design, and methods of data collection. Prerequisite: graduate standing, a laboratory course in psychology, and an elementary course in statistics.

- 203 Experimental Foundations of Psychology: Learning, Memory, and Cognition (3)** Dopkins
Current conceptions of learning, memory, and cognition; the research upon which these conceptions are based; applications to practical contexts.

- 204 Experimental Foundations of Psychology: Biological Basis of Behavior (3)** Rothblat
Introduction to the structure and function of the nervous system. Topics include neural communication, sensory processes, memory, neuroendocrinology of sex differences and stress, psychiatric and neurodegenerative disorders.

- 207-8 Psychological Assessment (3-3)** Staff
Open only to clinical graduate students in the Department of Psychology. Theoretical and clinical aspects of assessment; includes interviewing, psychometric tests, and projective techniques. Two-hour laboratory—diagnostic work at clinical facilities. Material fee, \$30 per semester. (Academic year)

- 210 Developmental Theories and Issues (3)** Staff
Orientation to the field of developmental psychology, with emphasis on traditional and contemporary theories, fundamental concepts and issues, and methodological approaches.

- 211 Assessment of Cognitive Functioning (3)** Staff
Concepts of intelligence and achievement and their assessment through a variety of individual procedures. Material fee, \$30. Admission by permission of instructor. (Summer)

- 212 Personality Assessment by Projective Techniques (3)** Staff
 Personality assessment: Rorschach, TAT, and other apperception methods. Material fee, \$25. Admission by permission of instructor. (Summer)
- 213-14 Seminar: Developmental Psychology (3-3)** Abravanel
 Psyc 213: research and theory in developmental psychology, with topics drawn from cognitive, perceptual, and language functioning development. Psyc 214: current research and theoretical issues in social and personality development in childhood and adolescence. (Academic year)
- 215 Psychodynamic Approaches to Child Assessment and Therapy (3)** Staff
 A broad range of issues in child personality development will be considered, with special focus on drives, interpersonal relations, defenses, intellectual capacities, and moral development. Admission by permission of instructor. Material fee, \$25. (Fall)
- 216 Developmental Disabilities (3)** Ganiban
 A comprehensive introduction to the field of developmental disabilities. Origins, evolution, and long-term consequences of developmental disabilities. Genetic and biological origins of disabilities.
- 218 Effective Interventions: Methods and Research (3)** Staff
 Introduction to theory and technique of psychotherapeutic approaches of proven effectiveness. (Spring and summer)
- 219 Group Dynamics (3)** Staff
 Relationship of the individual to groups, collectivities, and larger social systems. Theory, research, and applications of group and organizational processes. (Spring)
- 221-22 Seminar: Group Psychotherapy (3-3)** Staff
 For graduate students in the clinical psychology program. Open to others if space permits and with permission of instructor. Psyc 221: Survey of group therapy approaches; Psyc 222: Supervised experience with therapeutic groups. Prerequisite to Psyc 221: Psyc 219. (Alternate academic years)
- 223 Seminar: Human Memory (3)** Staff
 Selected topics of current research interest in the area of human memory. Emphasis on encoding and retrieval processes, amnesia, and disorders of memory.
- 225 Behavioral Approaches to Child Assessment and Therapy (3)** Rohrbeck
 Child assessment and treatment from a behavioral viewpoint. The application of conditioning, reinforcement, and shaping principles with reference to specific disorders of childhood.
- 226 Seminar: Clinical Psychology of Childhood and Adolescence (3)** Frank
 For graduate students in psychology; open to others with permission of instructor. Exploration of major topics concerning psychopathology in children and adolescents; discussion of nosological issues with emphasis on theoretical and research literature.
- 227-28 Seminar: Principles of Psychotherapy (3-3)** Staff
 For graduate students in clinical psychology; open to others with permission of instructor, if space permits. Patient's needs and demands on the therapist. Case participation heavily relied upon. Prerequisite: Psyc 218. (Alternate academic years)
- 229 Seminar: Principles of Behavior Change (3)** Peterson
 Behavioral learning methods and theory applied to clinical problems. (Fall)
- 231 Development of Psychometric Instruments (3)** Moore
 Quantitative techniques and principles used in construction, standardization, and evaluation of personality and ability measures for research and practice; quantification of human judgment for measurement purposes. Prerequisite: course in tests and measurements and an elementary course in statistics. (Fall)
- 232 Ego Psychology and Theories of Object Relations (3)** Staff
 For graduate students in clinical psychology; open to others with permission of instructor. Examination of psychodynamic ego psychology, object relations theories, and self psychology. Emphasis on formulations of characterological disorders, including borderline and narcissistic syndromes. (Spring)
- 235 Seminar: Community Psychology (3)** Rohrbeck
 For graduate students in the Department of Psychology; open to others, with permission of instructor, only if space permits. Survey of issues and techniques

- in community psychology; emphasis on educational systems and community psychology issues.
- 236 **Seminar: Minorities and Mental Health (3)** Zea
Factors affecting the mental health of minorities. Treatment considerations and differences in theoretical approaches with respect to minorities. (Spring)
- 237-38 **The Practice of General Psychology (3-3)** Staff
Application of psychological principles and findings to a wide spectrum of human problems. Professional issues facing the psychologist offering services. Participation in the development, implementation, and evaluation of applied psychological services and projects. (Academic year)
- 240 **Psychopathology (3)** Molock
Research and theory in psychopathology. (Fall)
- 241-42 **Family Systems: Theory, Practice, and Research (3-3)** Howe
Family dynamics and their implications for assessment and treatment. Special emphasis on the role of research in the process of evaluation of family systems and family therapy. Enrollment limited to advanced doctoral students in clinical psychology. (Academic year)
- 243 **Psychoanalytic Theory and Research (3)** Staff
Introduction to psychodynamic theory and research, with emphasis on current developments in modern psychodynamic theory, and the application of current formulations to the understanding and treatment of psychopathology.
- 244 **Theories and Processes of Organizational Management (3)** Staff
Basic functions and techniques of organizational management—design, control, direction, and decision making—examined from the viewpoint of behavioral science.
- 245 **Seminar: Organizational Behavior (3)** Offermann
Analysis of organizational behavior; emphasis on motivation and productivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design. (Fall)
- 246 **Seminar: Personnel Evaluation Techniques (3)** Staff
Techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, performance ratings, and assessment centers. Federal guidelines in employee selection. Includes practicum.
- 247 **Seminar: Psychology of Leadership in Organizations (3)** Offermann
Theories and issues related to the emergence and effectiveness of leaders, with focus on leadership behaviors and processes in organizations.
- 248 **Research Applications to Organizational Intervention and Change (3)** Staff
Emphasis on development of models of organizational effectiveness; design of valid diagnostic instruments; implementation of research strategies; establishment of program evaluation criteria. (Fall)
- 251 **Behavioral Neuroscience (3)** Rothblat
The neural basis of behavior, with special focus on the psychobiological determinants of learning, memory, and cognition. Methodologies used for different levels of analysis with normal and brain-impaired subjects.
- 253 **Social Cognition (3)** Staff
Social psychology theories, conceptual approaches, and their applications. Social cognition, person perception, attribution, information processing, attraction, stereotyping.
- 254 **Social Influence (3)** Offermann
Social psychology theories, conceptual approaches, and their applications. Analysis of intentional and unintentional social influence processes and their effects on behavior. Current research on conformity, social power, social exchange, and impression management.
- 255 **Attitudes and Attitude Change (3)** Poppen
Current theory and research on attitudes and attitude change.
- 256 **Introduction to Survey Research (3)** Poppen
Theory and practice of face-to-face telephone and mail surveys. Practical experience with all stages from the formulation of research questions and hypotheses to questionnaire design, sampling, pilot testing, interviewing, coding, and data cleaning. Prerequisite: Stat 105 or equivalent. (Fall)
- 257 **Current Topics in Social Psychology (3)** Poppen
Advanced seminar with focus on major theoretical approaches, research, or problem areas within field of social psychology. Topic changes each semester. (Fall and spring)

- 259 **Psychology of Individual and Group Decision Making (3)** Staff
Examination of processes in organizational decision making and group behavior. Topics include group and individual decision-making approaches, decision aids and support systems, performance and decision effectiveness, and risk analysis.
- 260 **Psychology of Work Group Development (3)** Offermann
Examination of theory and research on groups as task performance systems. Approaches to team development as a means of improving work group effectiveness, including goal setting, role clarification, increasing interpersonal skills, and conflict resolution. (Spring)
- 263 **Evaluation Research (3)** Staff
Research issues and methods in evaluating the impact of organizational and social intervention and service programs. Specification of program goals and effectiveness criteria; measurement problems; experimental and quasi-experimental designs; political problems surrounding evaluation research. (Spring, even years)
- 268 **Seminar: Neuropsychology (3)** Rothblat
Selected problems in research relating the brain and behavior. Independent topics each semester, such as sensory processing, brain development and behavior, clinical aspects of nervous system function.
- 277 **Health Psychology (3)** Poppen, Moore
Social psychological theories and research that relate to health and illness. Application of theories of social learning, attribution, attitude change, and social influence to topics such as health promotion and disease prevention, health compliance, and coping with illness and disability.
- 278 **Behavioral Medicine (3)** Peterson
The psychological causes, outcomes, and treatments for a wide variety of medical illnesses. Examination of research on the effectiveness of programs designed to promote health, to encourage compliance, and to foster lifestyle changes.
- 279 **Special Topics in Health Psychology (3)** Staff
May be repeated for credit provided the topic differs. Admission by permission of instructor.
- 281 **Clinical Neuropsychology I (3)** Rothblat
Analysis of experimental and clinical findings from studies attempting to localize and interpret human brain dysfunction, with emphasis on perceptual and cognitive behavior. Topics include overviews of neuroanatomy and neurological techniques, theoretical consideration of major neuropsychological disorders. Admission by permission of the instructor.
- 282 **Clinical Neuropsychology II (3)** Staff
Examination of important psychological procedures for the assessment of human brain dysfunction. Instruments and batteries such as the Bender-Gestalt, Wechsler Adult Intelligence Scale, Halstead-Reitan Neuropsychological Battery, and Luria's Neuropsychological Tests. Prerequisite: Psyc 211, 212, 281, and permission of the instructor.
- 287 **Current Topics in Clinical Psychology (3)** Staff
Advanced seminar with focus on major theoretical approaches, research, or problem areas. Topics vary. May be repeated for credit.
- 288 **Current Topics in Industrial/Organizational Psychology (3)** Staff
Advanced seminar with focus on major theoretical approaches, research, or problem areas. Topics vary. May be repeated for credit.
- 289 **Seminar: Current Topics in Experimental Psychology (3)** Staff
Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each semester; may be repeated for credit. (Fall and spring)
- 291 **Theories of Organizational Behavior (3)** Staff
Examination of current theoretical models and research. (Spring)
- 295 **Independent Research (3)** Staff
Individual library or experimental research under supervision of staff member. Arrangements must be made with sponsoring faculty member prior to registration. May be repeated for credit.
- 298 **Directed Readings (1 to 3)** Staff
Supervised reading in selected fields within public administration. Admission by permission of instructor.

- 299-300 **Thesis Research (3-3)** Staff
 398 **Advanced Reading and Research (arr.)** Staff
 Limited to students preparing for the Doctor of Philosophy major field examination. May be repeated for credit.
 399 **Dissertation Research (arr.)** Staff
 Limited to Doctor of Philosophy candidates. May be repeated for credit.

PUBLIC ADMINISTRATION

Professors S.R. Chitwood, M.M. Harmon, W.C. Adams, S.J. Trachtenberg, K.E. Newcomer
 (Chair), J.E. Kee, C.J. McSwain, H.L. Wolman, D.L. Infeld, M.J. Worth
Associate Professors J.F. Kastle, D.S. Cropp, P.G. Joyce, M. Moser
Assistant Professors L.A. Brainard, J.M. Brinkerhoff

See the School of Business and Public Management for programs of study leading to the degrees of Master of Public Administration and Doctor of Philosophy; see the next entry for programs of study leading to the Master of Public Policy.

- 201 **Public Administration and Management: Part I (3)** Harmon, McSwain
 An introduction to the important historical issues in the formation of the field of public administration and the American social/political context of its development. Focus upon traditional management roles, linked to central normative concerns of the field. (Fall)
- 202 **Research Methods and Applied Statistics (3 or 4)** Adams, Newcomer
 Development of skills and knowledge for conducting original research and critically evaluating empirical studies. Various research designs and data collection techniques are examined. Focus on computerizing data sets for quantitative analysis, analyzing strength of relationships, selecting appropriate statistical techniques, and testing statistical hypotheses. Same as PPol 202. (Fall and spring)
- 203 **Federal Policy, Politics, and Management (3)** Kee, Cropp
 Critical analysis of the structure and administration of the federal government from both a managerial and political perspective. Emphasis on executive branch organization, integration, and coordination, as well as current trends in government regulation, accountability, and effectiveness. (Fall and spring)
- 204 **Public Administration and Management: Part II (3)** McSwain, Brinkerhoff
 Aspects of organizational and management practice, including issues of improvement/excellence, employee development and evaluation, small-group/team work, and efficiency/effectiveness/accountability as applied to public administration. Prerequisite: PAd 201. (Spring)
- 205 **Public Budgeting, Revenue, and Expenditure Analysis (3 or 4)** Joyce
 Survey course that focuses on the institutions and analytical tools associated with raising revenue and allocating/managing resources at all levels of government. Hands-on budgeting skills and communication of analysis to decision makers. (Spring)
- 206 **Policy Analysis (3)** Moser, Infeld
 Development of skills in conducting and critiquing policy analyses. Application of methodologies used in analyzing possible consequences of specified alternatives as applied in the public policy decision-making process. Appropriate applications and limitations of policy analysis and its relationship to politics and the policy process. Same as PPol 203. (Spring)
- 208 **Public Administration and Management: Part III (2)** McSwain
 A practicum course enabling students to apply material from PAd 201 and 204 to the practice of public administration. Students with less than three years of administrative work experience will be required to participate in a supervised internship, while those with professional experience may choose an alternative format. Prerequisite: PAd 201 and 204. (Fall, spring, and summer)
- 209 **Public Administration and Management: Part IV (3)** Brainard
 Review of the diverse concepts and issues in public administration; analysis and integration of ethical, political, economic, managerial, and personal values and issues in the field. Open only to M.P.A. degree candidates in their final semester of study; serves as a capstone seminar to the M.P.A. program. (Spring)
- 212 **Legislative Management and Congress (3)** Brainard
 Analysis of Congress as a management system; examination of its internal administration and its role in formulating policy through legislation. Staffing

practices, leadership, rules and procedures, oversight functions, and coalition building. (Fall)

214 U.S. Competitiveness in the Global Economy—

Brainard

Trade and Investment Policy (3)

Analysis of U.S. competitiveness in the postindustrial era focusing on the political economy of the U.S. in comparison with Western Europe and Japan. Emphasis on technology transfer, trade and investment policies, the state of the manufacturing sector, fiscal and monetary policy, and the role of government. (Spring)

215 Law and the Public Administrator (3)

Kasle

Exploration and analysis of the functions of law in a democratic society. Emphasis is placed upon the procedural, historical, and jurisprudential dimensions of American law. This broad perspective seeks to convey understanding of the law as a legal and moral force guiding and constraining public decision making. (Spring and summer)

216 Federal Government Regulation of Society (3)

Brainard

Analysis of the federal regulatory process as it affects the public and private sectors. The regulatory process from legal, economic, administrative, and political perspectives. (Spring)

217 Seminar: Development Administration I (3)

Brinkerhoff

International development theories, policies (mainstream, reform, alternative), actors (donors, governments, NGOs). Regional and comparative issues. A theoretical and institutional context in preparation for overseas work in developing or transitioning countries. (Fall)

218 Seminar: Development Administration II (3)

Brinkerhoff

The role of non-governmental organizations as implementers and advocates of international development policies and services. Nonprofit strategic management perspectives and approaches. The challenges and opportunities of local and international development NGOs. (Spring)

221 Organization Theory and the Public Sector (3)

Harmon

Analysis of organization theory with special focus on public organizations; current issues in organization theory; decision making; the organizational environment and the changing nature of organizations in a postindustrial society. (Fall and spring)

223 Behavioral Factors in Complex Organizations (3)

McSwain

Analysis of the nature and characteristics of human behavior in public organizations. Approaches to management and behavior in public organizations; small groups and teams. (Fall and spring)

224 Managerial Leadership in Complex Organizations (3)

Kee

What the manager must know and do to provide leadership and guidance in large, complex organizations. An exploration of factors and processes that condition effective executive and managerial leadership. (Spring)

225 Ethics and Public Values (3)

Harmon

Ethical dimensions of personal and professional judgments of public officials. Cases are used to consider the ethos of public organizations and the moral foundations of public policy. (Fall)

242 Managing State and Local Governments (3)

Cropp

Examination of state and local governmental structures and functions, their place within the federal system, their revenue sources, their limitations, and the alternatives available to encourage more effective administration to meet public and private demands. (Fall)

243 Land Use Planning and Community Development (3)

Staff

Theory and practice of land use planning. Issues of competing land uses in an era of increased sprawl, population pressure, and environmental threat. Growth management techniques and practices in states and localities; the use of various regulatory controls and economic incentives to achieve desired outcomes. The idea of "sustainable community." (Spring)

248 Financing State and Local Government (3)

Kee, Moser

Analysis of the theory and practice of public finance in state and local governments. Includes the financing of services through municipal taxation, intergovernmental funds, debt instruments, and other revenue sources. Review of expenditures as well as financial management practices. (Spring)

- 249 **Urban and Regional Policy Analysis (3)** Cropp
Examination of selected national policies and their effects on urban areas and governments. Emphasis on policy dimensions of urban systems and their relationship to the social, political, and economic context. Against the background of urban politics and administration, areas of health, education, welfare, manpower, transportation, and housing are addressed. (Spring)
- 251 **Governmental Budgeting (3)** Joyce
Survey of the actors, institutions and processes in the U.S. budgeting system. Executive budget preparation/execution, legislative review and approval of budget requirements, and independent audit of government spending. (Fall)
- 253 **Financial Management in the Public Sector (3)** Moser
Intensive analysis, using the case study approach, of concepts and principles used in the not-for-profit sector for financial management purposes. Disciplines of accounting, budgeting, operations control, management, and auditing are integrated into comprehensive management control systems and include issues of system design and implementation. (Spring)
- 254 **Seminar in Public Budgeting and Tax Policy (3)** Joyce
Advanced seminar dealing with current budget and tax policy issues. Focus on student research projects that demonstrate detailed understanding of financial issues as they relate to recent fiscal trends and proposals included in current budgets and revenue codes. Evaluation of tax regimes and budgeting policies, procedures, and processes. (Summer)
- 260 **Policy Formulation and Administration (3)** Staff
Impact of economic and political factors on public policy formulation and implementation; intensive analysis of the analytical, normative, and decision-making models of the policy process with special emphasis on their relationship to current policy problems. (Summer)
- 264 **Public and Nonprofit Program Evaluation (3)** Newcomer
Theory and practice of program evaluation and evaluative research. Exploration of scope and limitations of current practice in evaluation, considering economic, political, social, and administrative factors. Examination of methodological considerations for design, data collection, analysis, and dissemination. (Spring)
- 265 **Environmental Ethics (3)** Staff
Within the core issue of human obligations toward nonhuman beings and the natural world, specific issues include "intrinsic value in nature," the moral standing of animals and plants, and how nonhuman interests should be weighed in relation to human interests. Broader questions about the human place in nature.
- 266 **Environmental Policy (3)** Staff
Current issues in environmental policy: biodiversity, land use including wilderness protection, climate change, environmental justice, economic growth, and ecological sustainability.
- 267 **Current Topics in Public Policy (1 to 3)** Staff
Critical analysis of topical issues in public policy, using a case-study approach. Specific issues covered will vary. (Fall, spring, and summer)
- 290 **Special Topics (3)** Staff
Experimental course; new course topics and teaching methods. May be repeated once for credit.
- 296 **Statistical Applications in Public Administration (3)** Newcomer, Moser
Use of statistics, computers, and SPSS in research and program evaluations. Emphasis on interpretation and use of statistics. Development of basic statistical competency; frequency distribution, sampling, central tendency, variability, correlation, probability, regression. (Fall and spring)
- 298 **Directed Readings and Research (3)** Staff
Supervised reading in selected fields within public administration. Admission by permission of instructor. May be repeated once for credit.
- 299 **Thesis Seminar (3)** Staff
- 300 **Thesis Research (3)** Staff
- 311 **Seminar: Public-Private Sector Institutions and Relationships (3)** Staff
Same as SMPP 311.
- 323 **Seminar: The Policy Organization (3)** McSwain
Unique problems of complex organizations: public, private, and mixed. Emerging concepts and theories. Selected issues.

- 373 Seminar: Public Administration and American Political and Social Institutions (3)** McSwain
Contemporary and historical literature in the institutional and intellectual development of public administration. (Spring)
- 374 Seminar: Trends in Public Administration Theory (3)** Harmon
Survey of contemporary normative and epistemological issues in public administration theory and practice. Analysis of the past and present influence of logical positivism, behaviorism, humanism, existentialism, phenomenology, and postmodernism. (Fall)
- 377 Seminar: Foundations of Environmental Policy and Management (3)** Staff
Interdisciplinary approach to current issues in environmental policy and management. (Spring)
- 393 Current Topics and Research (1)** Staff
Current scholarship discussed in a seminar setting. The conduct of research and presentation of research findings. May be repeated for credit.
- 395 Research Methods (3)** Adams, Newcomer
Doctoral seminar on theory and practice in research methodology. Data sources and gathering, research models and designs. Critical evaluation of research studies. Emphasis on application of research methods to policy questions. (Spring)
- 397 Doctoral Seminar (1 to 3)** Staff
- 398 Advanced Reading and Research (arr.)** Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 Dissertation Research (arr.)** Staff
Limited to doctoral candidates. May be repeated for credit.

PUBLIC POLICY

Master of Public Policy Executive Committee

H.L. Wolman (*Director*), J.J. Cordes, S. Balla, E. Englander, W.B. Griffith, P. Joyce, K.E. Newcomer

Doctoral Committee

J.J. Cordes (*Director*), W.B. Griffith, C. Harrison, J.R. Henig, D.L. Infeld, A. Malik, I. Rotberg, R.P. Stoker, N. Vonortas, P. Wirtz, H.L. Wolman

Master of Public Policy—The Master of Public Policy degree program provides professional training in public policy as preparation for careers in government, business, and the nonprofit sector. The program includes courses from both the Columbian College of Arts and Sciences and the School of Business and Public Management and offers students the opportunity to earn their degree in either school. The 40-credit-hour degree program consists of 13 courses composed of a policy core; a two-course area of emphasis and a three-course policy field selected by the student; and two electives. All students complete a common policy core of courses in quantitative methods, policy analysis, and economics (PPol 202, 203, and 204) and, at the end of the program, a capstone seminar (PPol 215) that provides for a research application of the skills and knowledge learned in the other courses. The two areas of emphasis are policy analysis and research (CCAS) and public/private policy and management (SBPM). Courses required of students in the CCAS emphasis are PSc 229, PPol 211, and two courses chosen from Econ 222, Mgt 225, Phil 230, or Hist 214. Courses required of students in the SBPM emphasis are PPol 201, 205, and two courses chosen from PPol 207, 208, or PAd 205. There are many public policy fields available to students for their three-course field. The fields within CCAS include critical policy studies, education policy, environmental and natural resource policy, gender and social policy, health policy, labor market policy, national security policy, philosophy and social policy, telecommunication policy, environmental policy, urban policy, and race, ethnicity, and public policy. The fields available within SBPM are business-government relations, environmental policy and management, financial reporting and public policy, global competition (market governance, regulatory and trade policy), health policy, nonprofit management, managing public organizations, tourism and public policy, urban policy, and race, ethnicity, and public policy. The two electives may be drawn from departments throughout the University and should be selected with the faculty advisor's approval. Students with all undergraduate degree backgrounds are considered for admission. All students must meet the general requirements for their degree as stated under the respective school.

The Master of Public Policy is available as part of a J.D.-M.P.P. joint degree program with the GW Law School.

Columbian College of Arts and Sciences also offers interdisciplinary programs leading to the degrees of Master of Arts and Doctor of Philosophy in the field of public policy. Three M.A. programs enable students to concentrate in one of three policy areas, while completing a largely common core of courses in economics, politics, quantitative methods, and approaches to policy analysis.

Master of Arts in the field of public policy with a concentration in environmental and resource policy—See Environmental and Resource Policy.

Master of Arts in the field of public policy with a concentration in philosophy and public policy—See Philosophy.

Master of Arts in the field of public policy with a concentration in women's studies—See Women's Studies.

Doctor of Philosophy in the field of public policy—Required: the general requirements stated under Columbian College of Arts and Sciences, including (1) the prequalifying core curriculum: PPol 204, 211-12, Econ 222, Mgt 225, Phil 230, PSc 203 and 229, and PAd 221 or equivalent; (2) a written qualifying examination; (3) Mgt 391 or equivalent; (4) a minimum of 18 hours in one of ten policy fields: education policy, environmental and resource policy, gender and social policy, health policy, labor market policy, national security policy, science and technology policy, telecommunications policy, urban policy, and race, ethnicity, and public policy; (5) a written examination in a policy field.

Note: See the School of Business and Public Management and the Elliott School of International Affairs for other graduate degree programs with public policy concentrations.

201 Public/Private Policy and Management Processes (3)

The role of policy analysts in public policymaking. The impact that the political, economic, cultural, and bureaucratic context has on the policymaking process and outcomes. Political and ethical issues raised by the intricate interface of the private, not-for-profit, and public sectors in public policy formulation and implementation.

202 Research Methods and Applied Statistics (4)

Development of skills and knowledge for conducting original research and critically evaluating empirical studies. Various research designs and data collection techniques are examined. Focus on computerizing data sets for quantitative analysis, analyzing strength of relationships, selecting appropriate statistical techniques, and testing statistical hypotheses. Same as PAd 202.

203 Policy Analysis (3)

Development of skills in conducting and critiquing policy analyses. Application of methodologies used in analyzing possible consequences of specified alternatives as applied in the public policy decision-making process. Appropriate applications and limitations of policy analysis and its relationship to politics and the policy process. Same as PAd 206.

204 Economics in Policy Analysis (3)

The application of intermediate microeconomic theory to the study of public policy. Topics include: models of individual choice in policy analysis, policy aspects of models of the firm, theory of market failure and welfare economics, and resource allocation decisions in the public sector. Prerequisite: Econ 217 or equivalent. Same as Econ 221; credit cannot be earned for PPol 204 and SMPP 206.

205 Intermediate Qualitative and Quantitative Analysis (3)

Theory and practice of research methodology, with a public policy emphasis. Qualitative and quantitative data sources and gathering, research models and designs, and analysis and interpretation. Same as SMPP 295.

207 Environment, Energy, Technology, and Society (3)

The identification, examination, and evaluation of how environment, energy, and technology are interrelated and how these interactions influence policy formulation and implementation at the international, national, regional, industrial, and organizational levels.

208 Public Policy, Governance, and the Global Market System (3)

The role of public policy in the governance and transformation of national and global market systems, in the pre- and post-war periods. Case studies and in-

dustry analyses of financial services, information services, biotechnology, and transportation sectors.

211-12 Research Methods in Policy Analysis (3-3)

PPol 211: Multivariate research methods in policy analysis; PPol 212: multivariate and causal modeling, experimental and quasi-experimental designs, and measurement issues. Prerequisite to PPol 211: PPol 202 or equivalent. Prerequisite to PPol 212: PPol 211 and Mgt 225. (Academic year).

215 Capstone Seminar: The Ethics and Practice of Public Policy (3)

Policy theory and typologies; policy formulation, implementation, and evaluation; ethics and practice in policy analysis, policy processes, content, and contexts; and policy linkages to multiple disciplines. Students submit an analysis of a substantive policy primarily utilizing resources in the D.C. region.

295 Special Topics in Public Policy (3)

Topics announced in the *Schedule of Classes*. May be repeated for credit, provided the topic differs.

298 Independent Research (arr.)

Prerequisite: Permission of instructor and program director.

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination.

399 Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit.

RELIGION

University Professor S.H. Nasr

Professors H.E. Yeide, Jr., D.D. Wallace, Jr., A.J. Hildebeitel

Associate Professors P.B. Duff (Chair), R.J. Eisen

Assistant Professor V.K. Urubshuraw

Master of Arts in the field of Hinduism and Islam—Through its Department of Religion, The George Washington University participates in this Consortium of Universities program. The degree requires 36 credit hours, of which a majority must be taken at GW. Candidates must meet the general requirements of Columbian College of Arts and Sciences, including the Master's Comprehensive Examination. Complete information on the program is available from Professors Nasr and Hildebeitel of the Department of Religion.

Doctor of Philosophy in the field of American religious history—See History.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201 Special Topics in Religion (3)

May be repeated for credit provided the topic differs.

Staff

249 Myth, Ritual, and Language (3)

Method and theory in the interpretation of myth and narrative, ritual and sacrifice, and symbolism, with primary reference to the history of religions.

Hildebeitel

257 India's Great Epics (3)

The *Mahabharata* and the *Ramayana* are treated in alternate offerings of the course. These founding epic texts of devotional (bhakti) Hinduism are taught in English translation. Vernacular and performative versions of the epics and Western adaptations.

Hildebeitel

258 Currents of Modern Hinduism (3)

Hinduism since the early seventeenth century. Colonialism, the impact of missionaries, orientalism, reform, relations between Brahmanical and popular Hinduism, Sanskrit and vernacular traditions, regionalism, communalism, nationalism, fundamentalism, politicized "syndicated" Hinduism, and secularism.

Hildebeitel

260 Topics in the Study of Islam (3)

Study of sources and approaches to the investigation of Islam by both Western Islamicists and Muslim scholars, with discussion of the main controversial issues and differences in methods used by various schools of scholarship. Prerequisite: A course on Islam or permission of instructor.

Nasr

261 Topics in Islamic Thought (3)

Perennial major issues in Islamic theology, philosophy, and Sufism such as Divine Unity, prophetology, eschatology, religious knowledge, sacred law, and ethics. Prerequisite: A course on Islam or permission of instructor.

Nasr

- 271 **American Religion to 1830 (3)** Wallace
Religious thought and life during the Colonial and early National periods.
- 273 **American Religion Since 1830 (3)** Wallace
Religious thought and life from the Civil War to the present.
- 291-92 **Readings and Research (3-3)** Staff
Investigation of special problems.
- 299-300 **Thesis Research (3-3)**

ROMANCE LANGUAGES AND LITERATURES

- 270 **Seminar: Literary History (3)** Staff
Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 271 **Seminar: Literary Criticism (3)** Staff
Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 272 **Seminar: Literary Theory (3)** Staff
Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.
- 273 **Seminar: History of the Language/Linguistics (3)** Staff
Topic to be announced in the *Schedule of Classes*. May be repeated for credit provided the topic differs.

SCIENCE, TECHNOLOGY, AND PUBLIC POLICY

Program Committee: N.S. Vonortas (*Director*), J.M. Logsdon, R.W. Rycroft, R. Williamson

Master of Arts in the field of science, technology, and public policy—The Elliott School of International Affairs offers an interdisciplinary program that focuses on interactions among scientific development, technological innovation, and governmental activities, both domestically and internationally. The program is designed to train individuals to understand and manage issues of science and technology policy and strategy.

Prerequisite: the admission requirements stated under the Elliott School of International Affairs. Required: the general requirements stated under the Elliott School. The program consists of 40 credit hours, which includes 3 hours of a research project (IAff 298). Students must successfully complete a policy exercise as part of IAff 229. The two fields are science, technology, and international affairs; and an elective field (a minimum of three courses, which may be in a field offered in another Elliott School program, a field in an academic department, or a field in a specific issue area, such as space policy or economics of technological change). The science, technology, and international affairs field consists of IAff 220, 229, and at least one course chosen from IAff 221, 223, 224, 225; Econ 255; and approved topics courses taught as IAff 290.

Students must also successfully complete 7 hours of analytical competency. To fulfill this requirement, students may choose between (a) two courses from Econ 217, 218; PAD 264, 296; or other appropriate courses approved by the program director and one Elliott School skills-based course; or (b) one three-credit course listed above and four credit hours of skills-based courses. In instances where proficiency in a foreign language is judged by the program director and the dean to be integral to the student's program of study, it may be used to fulfill the analytical competency requirement. However, courses taken to develop language proficiency may not be counted toward the degree.

SECURITY POLICY STUDIES

Program Committee: G. Adams (*Director*), D. Avant, D. Dassa Kaye, J. Hershberg, S. Johnson, J. Post, B. Powers, R. Spector, K. Thachuk

Master of Arts in the field of security policy studies—This interdisciplinary program, offered by the Elliott School of International Affairs, prepares individuals for professional careers in international security and defense analysis.

Prerequisite: the admission requirements stated under the Elliott School of International Affairs and a bachelor's degree in a related field. Required: the general requirements stated under the Elliott School. The program consists of 40 credit hours in three fields: there is no thesis option. All students must take three courses in the required core field of international security issues (IAff 253; Hist 230; PSc 249). The second field must be chosen

from defense policy analysis; strategy and military history; transnational security; science, technology, and public policy; or U.S. national security or regional security. The third field may also be selected from the above or from an approved field in the M.A. program in international affairs. The three fields must represent at least two academic disciplines; no more than 21 hours of course work may be taken in any one department or discipline. Students should consult the program guidelines for specific course work within the fields.

Students must successfully complete four 1-credit skills-based courses and a 3-credit capstone course.

Familiarity with economic theory and concepts at the level of Econ 217 or 218 is required. The tool requirement must be satisfied by demonstration of proficiency in statistics or by demonstration of reading and oral proficiency in a modern foreign language by passing a language exam during the final 18 hours in residence. The academic program must include 3 credit hours of skills-based courses (IAff 201, 202); 1 credit of IAff 205 may also be applied to this requirement.

In addition to the courses listed in the program guidelines, a variety of other courses may be taken with approval of the program director or an academic advisor.

700 SERIES

The 700 Series is made up of experimental or special courses that are on the cutting edge of the academic endeavor. Often, courses in the 700 Series focus on interdisciplinary or very current issues in a field. Because 700 Series courses change each semester, students should consult the *Schedule of Classes* for offerings. Courses are listed with the participating departments; course descriptions appear in a specially designated section of the *Schedule*.

Courses numbered 701 are in general studies. 721 courses are interdepartmental. 751 courses are interschool, and 770s and 780s are taught by University Professors and are listed in this Bulletin under the designation of University Professors. The program is coordinated by the Director of Summer, Special, and International Programs.

SOCIOLOGY

University Professor A. Etzioni

Professors P.H.M. Lengermann (*Research*), R.A. Wallace, W.J. Chambliss, J.L. Tropea,

J. Austin (*Research*), S.A. Tuch, R. Weitzer, R.J. Cottrol, G.D. Squires (*Chair*)

Associate Professors H. Nashman, C. Deitch, M.A.P. Saunders

Assistant Professors S.R. Friedman, C.E. Kubrin, S. Cohen, I. Kennelly, D.S. Eglitis

Adjunct Professor J.M. Billson

Adjunct Associate Professors R.B. Zamoff, R. Whitaker, L. Joseph

Adjunct Assistant Professors N.A. Briggs, J.F. Markey, M. Mashayekhi

Assistant Professorial Lecturer K. Mulvey

Master of Arts in the field of sociology—Prerequisite: a bachelor's degree with a major in sociology or in an approved related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. All students must complete at least 30 credit hours of graduate course work plus a thesis (Soc 299–300). The following courses are required for the degree: Soc 230, 231, 238, 239, and either 232 or 240; plus two courses in a major field and one course in a minor field. Currently available fields of specialization are social stratification, criminology, and urban sociology. With the consent of an advisor, one graduate course in a related department or program can be used for either one of the major courses or for the minor course requirement.

Master of Arts in the field of criminal justice—This program is a joint offering of the Department of Forensic Sciences and the Department of Sociology. Prerequisite: a bachelor's degree in criminal justice, criminology, or a related field.

Required: the general requirements stated under Columbian College of Arts and Sciences. All students must complete at least 30 credit hours of graduate course work plus a thesis (Soc 299–300) or 36 credit hours of graduate course work without a thesis. The following courses are required for the degree: Soc 230, 231, 232 or 240, 258, 259; ForS 221, 224, 225; three elective courses chosen from Soc 260, 261, 262, and 263; and one elective forensic sciences course (ForS 214 and 220 are recommended). Students opting for a thesis substitute Soc 299–300 for two of the elective courses.

- 230 **Sociological Research Methods (3)** Kubrin, Friedman, Tuch
Survey of the procedures, methods, and problems of contemporary sociological data collection, with an emphasis on survey methods. Major topics include research design, instrument construction, survey sampling, and measurement. (Fall)
- 231 **Data Analysis (3)** Kubrin, Friedman, Tuch
Intensive study of quantitative data analysis techniques, with strong emphasis on computer applications. Prerequisite: Soc 230. (Spring)
- 232 **Qualitative Methodology: Doing Field Research (3)** Weitzer
Practical application of data collection methods in natural settings; observation, participant observation, and field experience. Emphasis on implementing research projects by using these methods for purposes of developing empirically grounded theory. (Fall)
- 238 **Development of Sociological Theory (3)** Chambliss, Kennelly, Eglitis
Development of sociology from the early 1800s to the 1920s. Intensive analysis of the classical theoretical statements. (Fall)
- 239 **Modern Sociological Theory (3)** Wallace, Kennelly, Eglitis
Intensive examination and evaluation of contemporary schools of sociological theory in Europe and America. Advanced analysis of theoretical perspectives. (Spring)
- 240 **Field Research in Organizational Settings (3)** Staff
Applications of field research techniques in formal organizational settings. Examination of the logic of qualitative inquiry and techniques of qualitative data collection. Intensive interviewing and participant observation in field settings are emphasized. (Fall)
- 244 **Sociology of Families and Kinship (3)** Staff
A systematic introduction to recent theoretical perspectives and empirical research on family patterns. The course combines a focus on how and why societal family patterns vary and change over time with an examination of how individuals vary in their experience of life course transitions, such as marriage, childbirth, employment, divorce, and retirement. (Fall)
- 245 **Race Relations (3)** Tuch, Squires
Systematic analysis of race relations and inequality, primarily in the United States. Topics include current status and recent trends in inequality, the institutional and organizational patterning of discrimination, the structure of racial attitudes, theoretical perspectives on race relations, and selected policy issues. (Spring)
- 246 **Comparative Race and Ethnicity (3)** Weitzer
Examination of race and ethnic relations in comparative, international perspective. Selected societies are analyzed in terms of patterns of racial and ethnic inequality, intergroup relations, institutional foundations of discrimination, social control systems, and sources of social change. (Spring)
- 248 **Race and Urban Redevelopment (3)** Squires, Friedman
An examination of sociological forces shaping the development of metropolitan areas, racial inequality, and the intersections of urban development and race relations. Major theories of urban and metropolitan development and causes of racial inequality; major past and current public policies.
- 250 **Urban Sociology (3)** Friedman, Squires
Systematic analysis of urbanization and life within urban areas, primarily in the United States. Topics include theoretical perspectives on urban growth and neighborhood change, housing, the community question, neighborhood effects on individuals within the metropolis, and selected policy issues.
- 252 **Selected Topics (3)** Staff
Examination of selected topics of general importance to sociology. May be repeated once for credit. (Fall and spring)
- 254 **Evaluation Research (3)** Staff
Systematic survey of the conceptualization, design, and practice of evaluation research. Prerequisite: Soc 230. (Spring)
- 255 **Practicum in Applied Research (3 or 6)** Staff
Supervised sociological research through an internship in a local organization (e.g., a government agency, a non-governmental organization, or a research firm). The internship must be for at least 10 hours a week. Weekly seminar; final paper. Prerequisite: completion of all methodology requirements for the M.A. degree. (Fall, spring, and summer)

- 258 **Deviance and Control** (3) Kubrin, Tropea, Weitzer
Examination of major theories and research in the field of deviance and social control, with special emphasis on recent empirical advances and comparative perspectives. (Fall)
- 259 **Criminology** (3) Kubrin, Chambliss, Weitzer
The status of various criminology theories. How the history and logic of science affect the scientific study of crime. Theories of crime causation and crime control; cross-cultural research on crime.
- 260 **Special Topics in Criminal Justice** (3) Chambliss, Kubrin, Weitzer
Examination of selected topics in criminal justice. May be repeated once for credit if the topic differs. (Fall and spring)
- 261 **Sociology of Law** (3) Chambliss, Tropea
The development and use of law in complex societies, including the different roles of civil and criminal law. The role of the sociology of law within the discipline of sociology. (Spring)
- 262 **American Corrections** (3) Austin
Analysis of adult and juvenile correctional systems in the United States, including probation, parole, jails, and prisons. Topics include theoretical perspectives, the impact of corrections on crime rates, and evaluations of sentencing and other reforms. (Spring)
- 263 **Race and Crime** (3) Kubrin, Weitzer
Examination of race, crime, and punishment in American society. Analysis of competing theoretical explanations for interracial differences in crime rates, and racial patterns in the apprehension, adjudication, and punishment of offenders. (Fall)
- 265 **Women, Welfare, and Poverty** (3) Staff
Same as WStu 265.
- 271 **Gender and Society** (3) Wallace, Kennelly, Eglitis
An examination of quantitative and qualitative research in the field of gender, with emphasis on current empirical research. (Fall)
- 272 **Theoretical Perspectives on Gender** (3) Wallace, Kennelly, Eglitis
Review of significant theoretical writings on gender and gender inequality, with a primary focus on contemporary sociological statements. (Spring)
- 273 **The Sex Industry** (3) Weitzer
Sociological examination of prostitution, pornography, and other forms of sex work in the United States and internationally. Topics include theoretical perspectives, structure of the sex industry, workers' experiences, gender issues, political conflicts, and policy implications. (Spring)
- 286 **The Law of Race and Slavery** (3) Cottrol
Same as Hist 286.
- 290 **Principles of Demography** (3) Staff
Same as Econ/Geog/Stat 290.
- 291 **Methods of Demographic Analysis** (3) Staff
Same as Econ/Geog/Stat 291.
- 295 **Research** (arr.) Staff
Independent study and special projects. Before permission is granted to register for Soc 295, the student must submit a written plan of study for the approval of the staff member of the department who will be directing the research. May be repeated once for credit. (Fall, spring, and summer)
- 299-300 **Thesis Research** (3-3) Staff

SPECIAL EDUCATION

See Teacher Preparation and Special Education.

SPEECH AND HEARING SCIENCE

Professor C.W. Linebaugh

Associate Professors M.D.M. Brewer, J.R. Regnell, G.M. Schulz (Chair)

Assistant Professors L. Bland-Stewart, L.R. Goldberg, S. Martinez, N.S. Richards

Assistant Professorial Lecturers M.E. Moody, B. Sonies, M. Bamdad

Clinical Instructors L. Jacobs-Condit, R.T. Walton

Master of Arts in the field of speech-language pathology—Prerequisite: the degree of Bachelor of Arts with a major in speech and hearing science from this University, or an

equivalent degree, and an appropriate score on the Aptitude Test of the Graduate Record Examination.

Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 40 credit hours of approved course work without a thesis or, with the approval of the department, 34 credit hours of approved course work plus a thesis (SpHr 299-300). All students must satisfy the academic and supervised practicum requirements of the Certificate of Clinical Competence awarded by the American Speech-Language-Hearing Association and satisfactorily complete the Master's Comprehensive Examination.

As one component of the Master's Comprehensive Examination, all students must take the National Examination in Speech Pathology available through the Educational Testing Service. Students must request the Testing Service to send copies of test scores to the Department of Speech and Hearing Science to be used in partial fulfillment of the general requirement in Columbian College for the Master's Comprehensive Examination. Test results must reach the department at least three weeks before graduation.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

- 201 Clinical Practicum in Speech-Language Pathology (1 to 6)** Bamdad
Supervised clinical practice in the evaluation and treatment of speech and language disorders; counseling of clients and families; development of treatment plans and writing of evaluation and progress reports. Admission by permission of the instructor. May be repeated for up to 6 credit hours. (Fall, spring, and summer)
- 202 Clinical Practicum in Audiology (1 to 6)** Bamdad
Supervised clinical practice in behavioral and electrophysiologic assessment of hearing, hearing aid assessment and fitting, and aural rehabilitation; counseling clients and families; writing evaluation and progress reports. Admission by permission of the instructor. May be repeated, but may not be taken for more than 6 credit hours. (Fall, spring, and summer)
- 210 Research in Communication Sciences and Disorders (3)** Goldberg
Review of fundamental issues and methods in clinical research, including group and single-subject experimental designs. Application of clinical research methodology and findings to assessment and treatment. Development of a research prospectus. Laboratory fee, \$12. (Spring)
- 220 Disorders of Articulation and Phonology (3)** Martinez
Survey of the nature and causes of impairments of speech sound production in children and adults. Differential diagnosis of oral motor versus phonological disorders; treatment approaches; identification and modification of regional dialects and foreign accents. Laboratory fee, \$12. (Spring)
- 221 Neurodevelopmental Disorders of Speech Production (2)** Martinez
Evaluation and treatment of infants and children with neurodevelopmental speech disorders, including cerebral palsy. Emphasis on management of pre-speech oral motor and feeding impairments. Laboratory fee, \$12. (Summer)
- 222 Acquired Neuromotor Disorders of Speech Production (2)** Goldberg
Examination of the neuroanatomical and neurophysiological bases and acoustic and perceptual characteristics of acquired dysarthrias and apraxia of speech. Evidence-based approaches to the assessment, differential diagnosis, and treatment of these disorders. Laboratory fee, \$12. (Summer)
- 230 Pediatric Language Impairments I (3)** Stewart
Survey of current approaches for assessing and treating language delays and disorders in infants, toddlers, preschoolers, school-age children, and adolescents. Review of standardized, observational, and ethnographic approaches used in language assessment; current models of intervention and service delivery. Laboratory fee, \$12. (Fall)
- 231 Pediatric Language Impairments II: Early Intervention (2)** Martinez
Theoretical and practical approaches for assessing and treating speech and language impairments in infants, toddlers, and preschool children. Methods used in family needs assessment, Individualized Family Service Plans, ethnographic and dynamic assessment; multidisciplinary team functioning. Laboratory fee, \$12. (Fall)
- 232 Pediatric Language Impairments III: School-Age Populations (2)** Stewart
Theoretical and practical approaches for identifying, assessing, and managing language-learning impairments in school-age children, including specific lan-

guage impairments and attention-deficit disorders. School-based service delivery models, IEPs, multidisciplinary collaborative programming. Laboratory fee, \$12. (Summer)

- 240 Neurogenic Communication Disorders (3)** Goldberg
Differential diagnosis of acquired speech and language disorders, with an emphasis on the aphasia acquired in adulthood. Evidence-based approaches to the assessment and treatment of adult neurogenic language disorders. Laboratory fee, \$12. (Fall)

- 241 Applied Neuroanatomy (3)** Schulz
Neuroanatomy and neurophysiology of systems underlying speech, language, and hearing. Neuroimaging techniques and investigations. Applications to the assessment and treatment of communication disorders. Laboratory fee, \$12. (Fall)

- 251 Seminar: Speech Fluency Disorders (2)** Staff
Consideration of stuttering and other disorders of speech rate and rhythm from developmental, linguistic, physiological, and psychosocial points of view. Investigation of evidence-based approaches to assessment and treatment. (Summer)

- 260 Voice Disorders: Evaluation and Treatment (3)** Regnell
Normal anatomy and physiology of the human vocal mechanism. Nature, causes, and clinical management of functional and organic voice disorders, including laryngectomy. Laboratory fee, \$12. (Fall)

- 276 Aural Rehabilitation (3)** Brewer
Habilitation/rehabilitation of the hearing impaired, including auditory training, speech reading, hearing aids, assistive listening devices, communication strategies, and counseling. Laboratory fee, \$12. (Fall)

- 277 Psychoeducational Management of Children With Hearing Impairment (3)** Brewer
Study of the psychosocial and educational effects of hearing loss. Assessment, remediation, and management approaches related to the education of the hearing impaired. Laboratory fee, \$12. (Summer)

- 281 Dysphagia (2)** Sonies
Anatomy and physiology of normal swallowing. Nature and causes of dysphagia in adults. Assessment, including clinical examination and radiologic methods; treatment. Laboratory fee, \$12. (Spring)

- 282 Augmentative Communication and Computer Applications in Communication Disorders (2)** Staff
Principles of assessment, development, and selection of augmentative and alternative communication systems; application through case studies. Computer applications, including review of selected hardware and software and selection criteria. Laboratory fee, \$20. (Summer)

- 290 Selected Topics in Clinical Audiology (1 to 3)** Staff
Advanced study of selected theoretical and clinical issues. May be repeated, but may not be taken for more than a total of 6 credits. (Fall, spring, and summer)

- 291 Selected Topics in Speech-Language Pathology (1 to 3)** Staff
Advanced study of selected theoretical and clinical issues regarding various aspects of practice in speech-language pathology. May be repeated but not for more than a total of 6 credit hours. (Fall, spring, and summer)

- 295 Independent Research in Speech, Language, and Hearing (arr.)** Staff

- 299-300 Thesis Research (3-3)** Staff

STATISTICS

Professors H.W. Lilliefors, J.L. Gastwirth, N.D. Singpurwalla, J.M. Lachin III, J.I. Verter (Research), H.M. Mahmoud, T.K. Nayak (Chair)

Associate Professors J. Rochon (Research), E.A. Thom (Research), S. Bose, R. Modarres, Z. Li

Assistant Professors N. Younes (Research), E. Bura, C. Tatsuoka, K. Ghosh, S. Kundu

Professorial Lecturers F. Ponti, P. Chandhok, P. Dasgupta

Associate Professorial Lecturer R.F. Teitel

Master of Science in the field of statistics—General prerequisite: course work in multivariate calculus, matrix theory, and regression analysis (Math 33 and 124; Stat 118).

Required: The general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 30 credit hours of course work without a thesis. In exceptional cases the department may approve a program of study consisting of 24 credit hours of course work plus a thesis (Stat 299–300). Candidates must pass a written Master's Comprehensive Examination. Two options are provided: applied statistics and mathematical statistics. For prerequisites and additional requirements specific to each option, see below.

Option in applied statistics—Required: Stat 201–2, 210, 217.

Option in mathematical statistics—Recommended prerequisite: course work at the level of advanced calculus. Required: Stat 201–2, 218, and either Stat 215 or 217.

In each option, additional courses are to be selected in consultation with the advisor.

Doctor of Philosophy in the field of statistics—Prerequisite: A master's degree in statistics or a related discipline. The main requirement is a strong background in mathematics, including courses in advanced calculus, linear algebra, and mathematical statistics (similar to Stat 201–2). Some deficiencies may be made up concurrently during the student's first year. In some instances, a student may enter the Ph.D. program with a bachelor's degree.

Required: The general requirements stated under Columbian College of Arts and Sciences, including satisfactory completion of (1) Stat 201–2, 217–18, 223 or 271, 257, 258, 263, 264, and at least two courses chosen from among Stat 262, 265–66, and 273–74; (2) a minimum of 15 additional credit hours as determined by consultation with the departmental doctoral committee; (3) proficiency in computer languages as demonstrated by course work or an examination; (4) the General Examination, consisting of two parts: (a) a written qualifying examination that must be taken within 24 months from the date of enrollment in the program and is based on the four-course core (Stat 257, 258, 263, 264) and (b) an examination to determine the student's readiness to carry out the proposed dissertation research; and (5) a dissertation demonstrating the candidate's ability to do original research in one of the following fields: Bayesian inference, biostatistics, design of experiments, multivariate analysis, nonparametric statistics, probability (theoretical or applied), reliability theory, robust methods, sampling, statistical computing, statistical inference, stochastic processes, and time series.

Master of Science and Doctor of Philosophy in the fields of biostatistics and epidemiology—See Biostatistics and Epidemiology.

With permission, a limited number of 100-level courses in the department may be taken for graduate credit; additional course work is required. See the Undergraduate Programs Bulletin for course listings.

201–2 Mathematical Statistics (3–3)

Ghosh

Distribution theory, sampling theory, estimation, sufficient statistics, hypothesis testing, analysis of variance, multivariate normal distribution. Prerequisite: Math 33, 124. (Academic year)

206 Multivariate Methods in the Behavioral Sciences (3)

Tatsuoka

Applications of advanced experimental design and multivariate analysis to the data of the social sciences. Design and analysis of single- and multiple-factor experiments, factor analysis, discriminant analysis, and other topics. Prerequisite: Stat 105 or 118 or equivalent and permission of instructor. Not open to graduate students in mathematical statistics.

207 Methods of Statistical Computing I (3)

Modarres

Error analysis, computational aspects of linear models, sweep operator, random number generation, simulation, resampling, Optimization, numerical integration (Gaussian quadrature, Simpson's rule); E–M algorithm. Prerequisite: Stat 118, 157–58; Math 124; knowledge of a programming language.

208 Methods of Statistical Computing II (3)

Modarres

Numerical linear algebra, matrix decomposition and eigenvalue problems. Smoothing and density estimation. Graphics, interactive and dynamic techniques for data display. Object-oriented programming. Prerequisite: Stat 118, 157–58; Math 124; and knowledge of a programming language.

210 Data Analysis (3)

Lachin

Review of statistical principles of data analysis, using computerized statistical procedures. Multiple regression and the general linear model, analysis of contingency tables and categorical data, logistic regression for qualitative responses. Prerequisite: Stat 118, 157 or 201, and 183 or equivalent. (Spring)

- 213 Intermediate Probability and Stochastic Processes (3)** Li
Discrete and continuous random variables and their distributions, conditional distributions and conditional expectation, generating functions and their applications, convergence of random variables; introduction to Brownian motion, homogeneous and nonhomogeneous Poisson processes and martingales. Prerequisite: Stat 201-2 or equivalent. (Spring)
- 214 Applied Linear Models (3)** Bura
Introduction to regression techniques for discrete and continuous response variables. The course includes a computing component using SAS and S+. Prerequisite: Math 33 and 124. (Fall)
- 215-16 Applied Multivariate Analysis (3-3)** Nayak, Modarres
Application of multivariate statistical techniques to multidimensional research data from the behavioral, social, biological, medical, and physical sciences. Prerequisite: Stat 119, 157-58; Math 124. (Alternate academic years)
- 217 Design of Experiments (3)** Bura
Design and analysis of single- and multiple-factor experiments. Includes block designs, repeated measures, factorial and fractional factorial experiments, response surface experimentation. Prerequisite: Stat 157-58; Math 124.
- 218 Linear Models (3)** Bura
Theory of the general linear parametric model. Includes least squares estimation, multiple comparisons procedures, variance components estimation. Prerequisite: Stat 201-2; Math 124.
- 221 Design of Experiments for Behavioral Sciences (3)** Tatsuoaka
Applications of advanced experimental design to research problems in behavioral sciences and education. Prerequisite: Stat 105 or 118 or equivalent and permission of instructor. Not open to graduate students in mathematical statistics. (Spring)
- 223 Bayesian Statistics: Theory and Applications (3)** Singpurwalla, Bose
An overview of Bayesian statistics, including its foundational issues, decision under uncertainty, linear models, expert opinion, and computational issues. Prerequisite: Stat 201-2. (Spring, alternate years)
- 224 Design of Medical Studies (3)** Rochon
Design of medical investigations, including the randomized clinical trial, observational cohort study, and retrospective case-control study. Specific methods regarding sample size, power and precision, and statistical procedures for randomization and sampling. Ethics of clinical trials and the intention-to-treat principle. Prerequisite: Stat 201 or 157. (Spring)
- 225 Biostatistical Methods (3)** Lachin, Li
Biostatistical methods for asymptotically efficient tests and estimates of relative risks and odds ratios from prospective and retrospective matched and unmatched studies. Fixed and random effects models. Logistic, conditional logistic, and Poisson regression models. Maximum likelihood and efficient scores. Prerequisite: Stat 201-2 or permission of instructor. (Fall)
- 226 Advanced Biostatistical Methods (3)** Li
Statistical methods for the analysis of longitudinal data: nonparametric, fixed effects, mixed effects, generalized estimating equations. Methods for the analysis of emerging data: group sequential analysis, Brownian motion, Bayesian methods, and stochastic curtailment. Other advanced topics of current research in biostatistics. Prerequisite: Stat 201-2 or permission of instructor. (Spring)
- 227 Survival Analysis (3)** Ghosh, Li, Tatsuoaka
Parametric and nonparametric methods for the analysis of events observed in time (survival data), including Kaplan-Meier estimate of survival functions, log-rank and generalized Wilcoxon tests, the Cox proportional hazards model and an introduction to counting processes. Prerequisite: Stat 201-2 or permission of instructor. (Fall)
- 231 Categorical Data Analysis (3)** Rochon
A study of the theoretical bases underlying the analysis of categorical data. Measures and tests of association; Mantel-Haenszel procedure; weighted least squares and maximum likelihood estimators in linear models; estimating equations; logistic regression; loglinear models. Prerequisite: Stat 201-2. (Fall, alternate years)
- 257 Probability (3)** Mahmoud
Probabilistic foundations of statistics, probability distributions, random variables, moments, characteristic functions, modes of convergence, limit theorems.

- probability bounds. Prerequisite: Stat 201-2, knowledge of calculus through functions of several variables and series. (Fall)
- 258 **Distribution Theory** (3) Gastwirth, Mahmoud
Special distributions of statistics, small and large sample theory, order statistics, and spacings. Prerequisite: Stat 257. (Spring)
- 259 **Advanced Probability** (3) Staff
Conditional expectation and martingales; weak convergence in general metric spaces and functional central limit theorems for i.i.d. random variables and martingales; applications to biostatistics. Prerequisite: Stat 257 or an equivalent measure-theoretic introduction to probability.
- 262 **Nonparametric Inference** (3) Staff
Inference when the form of the underlying distribution is unspecified. Prerequisite: Stat 201-2.
- 263 **Advanced Statistical Theory I** (3) Nayak, Bose
Decision theoretic estimation, classical point estimation, hypothesis testing. Prerequisite: Stat 201-2. (Fall)
- 264 **Advanced Statistical Theory II** (3) Nayak, Bose
Asymptotic theory, hypothesis testing, confidence regions. Prerequisite: Stat 257, 263. (Spring)
- 265 **Multivariate Analysis** (3) Nayak
Multivariate normal distribution. Hotelling's T^2 and generalized T^2 , Wishart distribution, discrimination and classification. Prerequisite: Stat 201-2. (Fall, alternate years)
- 266 **Topics in Multivariate Analysis** (3) Nayak
Multivariate analysis of variance, principal components, canonical correlation, factor analysis. Prerequisite: Stat 265. (Spring, alternate years)
- 271 **Foundational and Philosophical Issues in Statistics** (3) Singpurwalla
Axiomatic underpinnings of Bayesian statistics, including subjective probability, belief, utility, decision and games, likelihood principle, and stopping rules. Examples from legal, forensic, biological, and engineering sciences. Students are expected to have a background in computer science, economics, mathematics, or operations research. Prerequisite: Stat 201-2.
- 273-74 **Stochastic Processes** (3-3) Mahmoud, Singpurwalla
Fundamental notions of Markov chains and processes, generating functions, recurrence, limit theorems, random walks, Poisson processes, birth and death processes, applications. Prerequisite: Stat 201-2. (Alternate academic years)
- 275 **Econometrics I: Introduction** (3) Staff
Same as Econ 275. (Fall)
- 276 **Econometrics II: Simultaneous Equations Models** (3) Staff
Same as Econ 276. (Fall)
- 281 **Advanced Time Series Analysis** (3) Staff
Autoregressive integrated moving average (ARIMA) modeling and forecasting of univariate and multivariate time series. Statespace or Kalman filter models, spectral analysis of multiple time series. Theory and applications using the University computer. Prerequisite: Math 33, Stat 201-2 or equivalent. (Spring)
- 287-88 **Modern Theory of Sample Surveys** (3-3) Chandhok
Application of statistical theory to the sampling of finite populations. Simple, stratified, cluster, double and subsampling. Special topics, including super-populations and randomized response. Prerequisite: Stat 91 and Math 32 or equivalent. (Academic year)
- 289 **Seminar** (3) Staff
Admission by permission of instructor. (Fall and spring)
- 290 **Principles of Demography** (3) Staff
Same as Econ 290.
- 291 **Methods of Demographic Analysis** (3) Staff
Same as Econ 291.
- 295 **Reading and Research** (3) Staff
May be repeated once for credit.
- 297 **Joint Doctoral Seminar on Current Topics in Epidemiology and Biostatistics** (3) Staff
Review of current topics of interest or controversy in epidemiology and in biostatistics. Students research an assigned topic in a tutorial setting with an as-

signed proctor and present their research findings to the seminar. Prerequisite: admission to Unit II of the Ph.D. program. (Summer)

- 299-300 **Thesis Research** (3-3) Staff
 398 **Advanced Reading and Research** (arr.) Staff
 Limited to students preparing for the Doctor of Philosophy general examination.
 May be repeated for credit.
 399 **Dissertation Research** (arr.) Staff
 Limited to Doctor of Philosophy candidates. May be repeated for credit.

STRATEGIC MANAGEMENT AND PUBLIC POLICY

Professors H.J. Davis, W.H. Becker, D.I. Lenn

Associate Professors J.B. Thurman (*Chair*), J. Cook, E.J. Englander, J.H. Beales III, M. Starik, L. Burke

Assistant Professors D.R. Kane, R.A. Carruth, J. Griffin, A. Prakash, B.S. Teng, J.W. Geranios

Professorial Lecturer W.N. LaForge

See the School of Business and Public Management for programs of study in business administration leading to the degrees of Master of Business Administration and Doctor of Philosophy.

- 202 **Business-Government Relations** (3) Englander, Becker
 Historical and philosophical foundations of the business-government relationship. Regulation, international trade, and corporate political activities. Public policy issues facing business and the business community's political response. Prerequisite: MBAd 260 or equivalent. (Fall)
- 205 **Business Representation and Lobbying** (3) Staff
 Strategies, tactics, and techniques used by business in representing itself to the legislative and executive branches and regulatory agencies of the federal government. Legal and practical constraints. Ethical considerations. (Spring)
- 206 **Applied Microeconomics** (3) Beales and Staff
 Applications of economic theory to public and private decisions with emphasis on public policy analysis. Focus on market structure and its implications. Imperfect information, common property, public goods and externalities. Economic analysis of government behavior and legal institutions. Prerequisite: Econ 217 or 219 and MBAd 220 or equivalent. (Fall)
- 208 **Macroeconomic Policy and Business** (3) Staff
 Determination of national income, employment, inflation, and interest rates. The role of expectations in the economy. Impact of government purchases, tax policy, and deficits. Monetary policy institutions. The global economy and exchange rates. Prerequisite: Econ 218 or 219 and MBAd 220 or equivalents. (Fall)
- 209 **Seminar: Business Economics and Public Policy** (3) Englander, Becker
 Analysis and discussion of selected issues by students and representatives of government and business. Prerequisite: SMPP 202 or MBAd 260 or equivalent. (Spring)
- 210 **Strategic Environmental Management** (3) Starik
 Examination and analysis of the orientation and actions of private, public, and nonprofit sectors in relation to their natural environments. Emphasis on organizational interaction and effectiveness, particularly regarding business firms and industry, on issues of environmental quality and sustainability. (Fall)
- 211 **Business Law: Contracts, Torts, and Property** (3) Staff
 Same as Accy 211.
- 212 **Business Law: Enterprise Organization** (3) Staff
 Same as Accy 212.
- 213 **Management of Strategic Issues** (3) Staff
 The body of management theory and practice that has evolved to identify, analyze, and resolve strategic organizational issues. Methodology of the field; applications to critical issues in labor relations, energy and pollution, marketing and consumerism, business-government relations, and the global economy.
- 290 **Special Topics** (3) Staff
 Experimental offering; new course topics and teaching methods. May be repeated once for credit.

- 291 **Ethics and Business** (3) Lenn, Griffith
Concepts and strategies of ethical analysis applied to specific business problems, e.g., risk management, plant relocation, preferential hiring, political advertising; development of theory of corporate social responsibility. Same as Phil 235. (Spring)
- 293 **American Business History** (3) Becker
The history of American business institutions in manufacturing, distribution, transportation, and finance. Particular attention will be given to the period since industrialization, with consideration of business institutions in their economic, legal, governmental, and social contexts. Same as Hist 220. (Fall)
- 295 **Intermediate Qualitative and Quantitative Analysis** (3) Davis and Staff
Theory and practice of research methodology, with a public policy emphasis. Qualitative and quantitative data sources and gathering, research models and designs, and analysis and interpretation. Same as PPol 205.
- 298 **Directed Readings and Research** (3) Staff
Supervised readings or research. Admission by prior permission of instructor. May be repeated once for credit. (Fall and spring)
- 299 **Thesis Seminar** (3) Staff
- 300 **Thesis Research** (3) Staff
- 311 **Seminar: Public-Private Sector Institutions and Relationships** (3) Staff
An analysis and critique of alternative theoretical frameworks for describing, understanding, and predicting the nature, values, and actions of American public and private institutions. Problems, potentials, and alternatives for structuring public and private institutional arrangements to meet the needs of society. Prerequisite: doctoral degree candidate status. (Fall and spring)
- 321 **Seminar in Strategic Management** (3) Staff
Develops understanding of the major research streams in strategic management; exposure to theoretical research frameworks and methodological issues and approaches.
- 331 **Seminar in Business and Public Policy** (3) Staff
Develops understanding of the major research streams in business and public policy; exposure to theoretical research frameworks and methodological issues and approaches.
- 391 **Seminar: Business Management** (3) Staff
Examination of major current issues, both theoretical and empirical, affecting the development of the business enterprise. Topics to be announced. Emphasis on policy and strategic issues affecting the total enterprise. (Offered as the demand warrants)
- 397 **Doctoral Seminar** (1 to 3) Staff
- 398 **Advanced Reading and Research** (arr.) Staff
Limited to doctoral candidates preparing for the general examination. May be repeated for credit.
- 399 **Dissertation Research** (arr.) Staff
Limited to doctoral candidates. May be repeated for credit.

TEACHER PREPARATION AND SPECIAL EDUCATION

Professors J.R. Shotel (*Chair*), M.S. Castleberry, R.N. Ianacone, A.J. Mazur, M.B. Freund, L.L. West, J.M. Taymans, N.B. Paley, C.A. Kochhar, S.J. Lynch
Associate Professors S.S. Beck, K.A. Steeves, L. Hall, A.U. Chamot, M.H. Jarrett, J.T. Jackson
Assistant Professors P.S. Tate, B.C. Browne (*Research*), C. Green, C. L. Pyke, P.J. Leconte (*Research*), K. Kortecamp (*Research*), J.A. Glazier, N.B. Milman, J. Comas, E.K. Hess
Associate Professorial Lecturers C. Muskin, S. Chough
Assistant Professorial Lecturers C.W. Yates, J.L. Embich, P.A. Bielski, M. Casper, R. Bogucki, J. Marston, J.C. Baker, A. Hughes-Booker, S. King
Lecturers T. Krankowski, B.A. Liebbrandt, G.D. Caputo, J.T. Hickman, K.I. Wood, R.E. Seremeth, L. Alderman-Cutler, L. Hills, C. Wallin, A. Biggins, K. Barron, K. Ihrig, E. Olive

See the Graduate School of Education and Human Development for programs of study leading to the degrees of Master of Arts in Education and Human Development, Master of Education, and Doctor of Education.

TEACHER EDUCATION

Department prerequisite: A bachelor's degree from an accredited institution is prerequisite to all 200-level courses in teacher education.

- 204 Perspectives in American Education (3)** Beck, Paley
Historical and social development of education in the United States; evolution of American education related to the growth of the nation and the changing social order; examination of selected issues in contemporary education.
- 205 Foundations of Curriculum Development: K-12 (3)** Paley
For experienced teachers. Examination of the educational ideas of individuals and groups that have influenced American curriculum theory and practice from the Progressive era through the twentieth century. Comparisons of the issues, models, and principles that have guided curricular thought, development, and innovation. (Summer)
- 206-7 Teaching and Learning (3-3)** Beck, Hall, Kortecamp
An overview of the principles of teaching, learning, and related research. Explores ways of knowing, models of teaching, classroom management, and the dynamic nature of the teaching/learning process. Structured observations and microteaching labs are required. Material fee, \$10 per semester.
- 208 Development and Diversity (3)** Green, Kortecamp, Steeves, Glazier
An examination of student diversity in relation to theories of human growth and development. Investigation of diverse student strengths and needs; the special needs population; the dynamics of inclusion; and intercultural issues related to the teaching/learning process. Material fee, \$20.
- 209 Reading Children's Literature Across the Curriculum (3)** Tate
Participants read and analyze multicultural children's literature (from folktale to nonfiction) while simultaneously practicing discussion, dramatization, art, and writing response strategies suitable for involving all students and integrating literature across the school curriculum. (Spring)
- 211 Elementary School Curriculum and Methods (3)** Beck, Green
A comprehensive block course with subsections in mathematics, science, language arts, social studies, and interarts and technology. Integrated with TrEd 235. May be repeated for credit up to 15 hours. Admission by permission of advisor. Material fee, \$10 per subsection.
- 215 Recent Developments in Teaching English (3)** Glazier
For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of English. Admission by permission of instructor. Material fee, \$20. (Summer)
- 216 Recent Developments in Teaching Social Studies (3)** Green, Steeves
For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of social studies. Admission by permission of instructor. Material fee, \$20. (Summer)
- 217 Recent Developments in Teaching Science (3)** Beck, Lynch
For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of science. Admission by permission of instructor. Material fee, \$20. (Summer)
- 218 Recent Developments in Teaching Mathematics (3)** Pyke
For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective teaching of mathematics. Admission by permission of instructor. Material fee, \$20. (Summer)
- 220 Selected Topics (arr.)** Staff
Topics and fees announced in the *Schedule of Classes*.
- 221 Developmental Reading: Emergent Literacy (3)** Comas
For educators interested in helping young children get a successful literacy start. Seminar discussions focus on research into the sociocultural context of early literacy development, the nature of emergent reading and writing behaviors, and implications for establishing "literate environment" preschool and kindergarten classrooms. (Fall and spring)
- 222 Foundations of Reading Development (3)** Comas
Basic theories and processes of reading acquisition and assessment; linguistic, cognitive, developmental, social, and affective bases of reading; influences of media, instructional strategies, including formal and informal assessment. (Fall)

- 223 **Reading Instruction in Content Areas: Elementary, Intermediate, and Secondary Schools (3)** Comas
Emphasis on acquisition and continuing development of content literacy, including integrated methods, media, and teaching demonstrations. (Fall)
- 224 **Diagnostic Teaching of Reading: K-6 (3)** Comas
Classroom teaching and assessment strategies for elementary teachers: construction of informal traditional and non-traditional reading and writing tests; other instruments of evaluation; selecting and planning activities suitable to specific problems. Prerequisite: at least one previous course in reading. (Spring)
- 226 **Diagnostic Teaching of Reading in Secondary School (3)** Comas
Application of instructional strategies and techniques presented in TrEd 223 and 224. Construction of informal tests; administering, scoring, and interpreting informal and standardized tests; study and evaluation of materials: teaching strategies for on-grade students and for those with reading problems. (Spring)
- 227 **Teaching Reading and Writing in English as a Second Language (3)** Chamot
An emphasis on acquisition and continuing development of content literacy, including integrated methods, media, and teaching demonstrations geared toward second language learning requirements. Material fee, \$10. (Spring)
- 228 **Instructional Areas in Elementary Education (3)** Beck
Current trends and research in reading, language arts, social studies, mathematics, science, music, art and physical education
- 229 **Current Issues in Elementary Education (3)** Beck
Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school.
- 232 **Professional Internship in Middle School Education (3 to 6)** Glazier, Hall, Kortecamp, Lynch, Pyke, Steeves
Supervised internship in middle schools; required seminar. Admission by permission of instructor. Material fee, \$15. (Fall and spring)
- 233 **Role of the Professional in Early Childhood Education (3)** Staff
Planning, reporting, maintaining records, teacher-child and teacher-family interaction, diagnosis and evaluations, working with paraprofessionals and parents. Emphasis on total classroom environment. (Spring)
- 234 **Professional Internship in Secondary Education (3 to 6)** Glazier, Hall, Kortecamp, Lynch, Pyke, Steeves
Supervised internship; required seminar. Admission by permission of instructor. Material fee, \$15 per credit hour. (Fall and spring)
- 235 **Professional Internship in Elementary Education (3 to 6)** Beck, Green, Tate
Supervised internship; required seminar. Admission by permission of instructor. Material fee, \$15 per credit hour. (Fall and spring)
- 236 **Analysis of Teaching (3)** Staff
Teaching viewed as a system; component aspects are examined with a view toward developing a critical method of analysis. Material fee, \$25. (Spring)
- 237 **Practicum in Early Childhood Education (3 to 6)** Staff
Supervised professional activity in selected early childhood programs; seminar. Prerequisite: 12 credit hours in early childhood education and permission of instructor. (Fall and spring)
- 238 **Clinical Practicum in Reading (3 to 6)** Comas
Supervised clinical experience, including observation and participation, in testing, tutoring, and teaching. Clients may include preschoolers through adults. Minimum of 120 clinic hours required. Admission by permission of instructor. Material fee, \$25.
- 239 **Practicum in Curriculum and Instruction (3 to 6)** Shotel
Supervised field experience in curriculum. Admission by permission of instructor. Prerequisite: TrEd 205. (Fall and spring)
- 240 **Teacher Leadership in Education (3)** Steeves
From the perspectives of educational theory and practice, the ideals and realities of contemporary public school teaching are viewed within a system of local, state, and federal organizations, with the goal of enhancing the role of teachers as knowledgeable and effective leaders in their profession. Prerequisite TrEd 204, 208, or equivalent. Material fee, \$20. (Spring and summer)

TrEd 246 through 251 offer theoretical, curricular, and practical considerations for teaching the content area concerned. Each course requires a 30-hour field experience in a secondary classroom. Prerequisite: TrEd 206-7 and the approved certification course work in the content area (math through calculus in the case of TrEd 250). Material fee, \$10 per course. Each course is offered in the fall semester.

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| 246 Teaching English in Secondary Schools (3) | Glazier |
| 247 Teaching Science in Secondary Schools (3) | Lynch |
| 248 Teaching Social Studies in Secondary Schools (3) | Steeves |
| 249 Teaching Art in Secondary Schools (3) | Staff |
| 250 Teaching Mathematics in Secondary Schools (3) | Pyke |
| 251 Second Language Instruction (3) | Chamot |
- A variety of methods for teaching a second language, both in the context of English as a Second Language and for foreign language instruction. (Fall)
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| 252 The English Sound System in English as a Second Language (3) | Staff |
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- A description of the phonological composition and variation of English as applied to instructional practices specifically oriented toward linguistically diverse groups. (Fall)
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| 253 The Structure of English in ESL Practice (3) | Staff |
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- A review of the morphological and syntactic characteristics of English, as related to instructional practices specifically oriented toward linguistically diverse groups. (Spring)
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| 254 Issues, Studies, and Practices in English as a Second Language (3) | Staff |
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- A critical review of scholarship and research findings in English as a second language. Major policy issues and implications that relate to ESL practice. (Summer)
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| 255 Educating Language Minorities (3) | Staff |
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- A study of federal, state, and local policies and issues affecting the education of linguistically diverse populations. Resources for use with specific linguistically diverse groups. (Spring)
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| 256 Linguistic Applications in English as a Second Language (3) | Staff |
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- A study of the science of language (phonology, morphology, syntax, semantics) and how its different branches (descriptive, social, applied, etc.) may be used for ESL teacher training, classroom instruction, material development, evaluation, research, and policy development. (Fall and summer)
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| 257 Second Language Acquisition (3) | Chamot |
|-------------------------------------|--------|
- Nature of first and second language acquisition and development; emphasis on sociolinguistics and psycholinguistics most pertinent to educational settings. (Fall and summer)
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| 272 Strategies for Inclusion: Addressing Needs of Special Populations (3) | Mazur |
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- Same as SpEd 272.
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| 275 The Culturally and Linguistically Diverse Student with Special Needs: Policy, Research, and Trends (3) | Mazur |
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- Same as SpEd 275
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| 276 Academic and Psychosocial Assessment of the Culturally and Linguistically Diverse Student (3) | Mazur |
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- Same as SpEd 276.
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| 287-88 Clinical Study and Treatment of Reading Problems (3-3) | Comas |
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- A case study approach is employed to develop participants' competence to assess and tutor children, adolescents, and adults of diverse backgrounds, presenting a variety of reading and writing difficulties. Prerequisite: TrEd 222 and 224. Material fee, \$25. (Academic year)
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| 289 Organization and Administration of Reading Programs (3) | Staff |
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- For school administrators and reading teachers. Problems in planning, organizing, and monitoring the total reading program. (Spring)
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| 290 Severe Learning Disabilities in Reading (3) | Staff |
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- The course links the fields of learning disabilities and reading, focusing on their interconnections in terms of etiology, characteristics, diagnosis, and remediation. (Fall)
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| 291 Reading and Writing Across the Curriculum (3) | Comas |
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- A framework is presented for establishing a whole-language approach. Participants explore principles and strategies for developing students' reading and writing skills in art, literature, social studies, mathematics, and science. (Fall, spring, and summer)

- 292 **Internship: Reading (3 to 6)** Staff
Limited to graduate students in reading education. Experience in a selected area of teaching or supervisory service in field-based programs. Prerequisite: permission of instructor. (Fall and spring)
- 297-98 **Research and Independent Study (1 to 3)** Staff
Individual research under the guidance of a staff member; program and conferences arranged with an instructor.
- 301 **Supervising the Preservice Clinical Experience (3)** Hall, Tate
An investigation of the complex process of clinical supervision as it relates to the professional growth and development of the practitioners at the preservice level, with a focus on both the interpersonal/social dimension and the process of instructional supervision. (Fall)
- 308 **Instructional Processes in Teacher Preparation and Special Education (3)** Kochhar
Same as SpEd 308.
- 325 **Curriculum Theory (3)** Paley
Examination of reviews and research studies on curriculum theory. Focus on trends, values, interpretations, design systems, and evaluation. Prerequisite: TrEd 205.
- 330 **Paradigms of Instruction and Assessment (3)** Green
A foundation of theory, models, and variables that have contributed to the fields of instruction and assessment. The major paradigms of instruction and assessment. Material fee, \$25. (Spring)
- 331 **Seminar in Instruction (3)** Pyke, Green
Analysis of alternative models of instruction and the factors that influence the instructional process in schools. Connections among instructional theory, research, and practice. Material fee, \$25. (Fall)
- 332 **Search of the Literature in Curriculum and Instruction (3)** Chamot, Lynch
Analysis of types of literature reviews in the field of curriculum and instruction and development of a literature review; the relationship of theory building to review of literature, and how research questions arise from extant theory and related literature. For doctoral students in curriculum and instruction, to precede TrEd 390. Material fee, \$25. (Spring)
- 333 **School Reform through Professional Development (3)** Staff
Fundamental perspectives of school reform through professional development of educators (K-12); evolution of contemporary professional development models and trends; examination of interactive modules using selected professional development activities. Material fee, \$25. (Spring)
- 345 **Consultation Skills in Teacher Preparation and Special Education (3)** West
Same as SpEd 345.
- 353 **Post-Master's Internship in Teacher Education (3 to 6)** Staff
Same as SpEd 353.
- 354 **Doctoral Internship: Teacher Education (3 to 6)** Staff
Same as SpEd 354.
- 370 **Attitude Change and the Access Process (3)** Castleberry
Same as SpEd 370.
- 378 **Post-Master's Internship in Curriculum and Instruction (3 to 6)** Staff
Supervised fieldwork for selected experienced teachers. (Fall and spring)
- 390 **Doctoral Seminar in Curriculum and Instruction (3 to 6)** Shotel
Review of literature in a topical area; preparation of a dissertation proposal and a manuscript of publishable quality. Admission by permission of instructor and approval of major advisor. Material fee, \$25. (Fall)
- 391 **Dissertation Research (arr.)** Staff
Prerequisite: TrEd 390.

SPECIAL EDUCATION

- 201 **Overview of Special Education (3)** Embich
Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children with special needs in a school program. (Fall)
- 220 **Selected Topics (arr.)** Staff
Topics and fees announced in the *Schedule of Classes*.

- 221 **Accessing Community Systems for Individuals with Disabilities** (3) Freund
Overview of access to community systems and service delivery for individuals with special needs and their families. Material fee, \$25. (Summer)
- 222 **Legal Issues and Public Policy for Individuals With Disabilities** (3) Kochhar, Leconte
Examination, interpretation, and analysis of legislation and policies affecting the education and career development of individuals with disabilities. Emphasis on federal and state legislation in the context of national policy reform in disability services. Material fee, \$25. (Fall)
- 226 **Vocational-Technical Education for Special Populations** (3) West
Preparation for leadership roles as vocational and technical education and transition personnel; overview of delivery models emphasizing special education. (Spring)
- 227 **Technology in Vocational Evaluation** (3) Leconte and Staff
Introduction to an array of assistive technology services and products facilitating professional interventions and vocational evaluation procedures; application to the assessment of persons with disabilities. Material fee, \$30. (Fall)
- 228 **Community-Based Assessment and Work Sample Development** (3) Leconte and Staff
Introduction to community-based vocational appraisal methods; development of job training analysis skills, labor market surveys, work samples; requirements of The Americans with Disabilities Act; incorporation of assistive technology; classroom theory and field work. Material fee, \$25.
- 229 **Interpretation and Application of Academic and Vocational Assessment Information** (3) Leconte
Specific strategies and techniques to analyze, interpret, and synthesize assessment information for the development of comprehensive academic/vocational profiles for adolescents and adults with disabilities. Observation and recording procedures, report development, and postassessment conferencing are emphasized. Material fee, \$25. (Summer)
- 230 **Vocational Assessment of Individuals with Disabilities** (3 to 6) Leconte
Investigation of vocational appraisal processes and techniques for individuals with disabilities. Includes assessment for transition using field-based assignments. Three credits of practicum experience for students specializing in vocational evaluation. Material fee, \$25. (Fall, spring, and summer)
- 231 **Instructional Methods in Special Education and Transition** (3) Taymans, West
Techniques and processes used in programming for the needs of individuals with disabilities as they prepare for transition to postsecondary programs and employment. Emphasis on skills related to professional liaison and support roles in the design of instructional arrangements and cooperative training. Taken concurrently with SpEd 233. Material fee, \$20. (Fall and spring)
- 232 **Foundations in Special Education, Career Development, and Transition** (3) Kochhar
Overview of historical, theoretical, and philosophical foundations of career development and transition. Explores directions for career development/transition practices in the context of social and political change. Material fee, \$25. (Fall)
- 233 **Curriculum in Transition Special Education** (3) Taymans, West
Theory and practice in planning, implementing, and evaluating curriculum for individuals with disabilities. Emphasis on techniques for modifying curriculum and materials for individualized programming. Requires field-site curriculum implementation. Usually taken concurrently with SpEd 231. Material fee, \$25. (Fall and spring)
- 234 **Seminar in Professional Development in Special Education and Transition** (3 to 6) Kochhar
Analysis and development of professional writing and presentation skills. Material fee, \$20. (Fall)
- 235 **Employment Models for Individuals with Disabilities** (3) Staff
Rationale, resources, and programming strategies for the development and coordination of employment programs for individuals with disabilities. Material fee, \$25.

- 236 **Introduction to Career, Vocational, and Transition Services (3 to 6)** West
Introduction to programs that provide career, vocational, and transition services to individuals with disabilities. Material fee, \$25. (Summer)
- 237 **Learning Strategies, Assessment, and Instruction for Learning Disabled Adolescents (3 to 6)** Taymans
Theory and practice in the provision of effective and appropriate educational services to learning disabled adolescents. Material fee, \$25. (Spring and summer)
- 238 **Issues in Educating Individuals with Learning Disabilities (3)** Taymans
Introduction to the academic, cognitive, social, and emotional characteristics of individuals with learning disabilities; etiological theories; educational service delivery models, with particular emphasis on the adolescent with learning disabilities. Policy issues, continuum of services, and the transition from school to post-school environments. Material fee, \$25. (Fall and spring)
- 239 **School Consultation for Professionals Working with Students with Learning Disabilities (3)** Taymans
Exploration of attitudes and beliefs about team teaching, collaboration and inclusionary environments. Development of knowledge and skills related to collaborative consultation and team teaching; interpersonal communication; the dynamics of collaborative teams; examination of the variety of environments in which special educators work. Material fee, \$25. (Fall and spring)
- 240 **Developmental Process of Parenting (3)** Jarrett
The developmental process of becoming a parent and ongoing parenting. Material fee, \$20. (Fall and summer)
- 241 **Dynamics of Family Intervention: Theory and Practice in Special Education (3)** Staff
Theoretical foundations and clinical techniques necessary for the special educator to collaborate with parents of adolescents with emotional and behavioral disabilities. Material fee, \$25. (Fall and spring)
- 242 **Neurodevelopmental Assessment and Programming for Infants and Toddlers with Disabilities (3 or 6)** Jarrett
Provides students with a theoretical background and practical experience to translate the neurodevelopmental model into techniques for developing and implementing educational programs for infants and toddlers with disabilities. Prerequisite or concurrent registration: SpEd 263 or 268 or permission of instructor. Material fee, \$30. (Fall)
- 243 **Developmental Assessment of Infants (3)** Jarrett
Theory and current practice in the assessment of infants with or at risk for developmental disabilities. Material fee, \$30. (Spring)
- 244 **Ethical Considerations in Neonatal and Infant Intervention (3)** Freund
Overview of the major ethical issues involved in neonatal and infant intervention. The impact of recent and emerging technological innovations considered from medical, legal, ethical, and psychosocial perspectives. Material fee, \$25. (Spring and summer)
- 245 **Medical and Developmental Implications for Premature Infants and Their Families (3)** Jarrett
Causes of prematurity and the implications of premature delivery on the infant and family. Specific medical conditions, treatment, long-term developmental implications, intervention, and planning. Material fee, \$25. (Spring)
- 253 **Special Education in Correctional and Alternative Settings (3)** Staff
An introduction to the delivery of special education services within a range of alternative settings and the juvenile justice and corrections systems. Material fee, \$25. (Spring)
- 254 **Special Education in Correctional and Alternative Settings: Field Experiences (3)** Staff
Site visits to local, state, and federal juvenile correction facilities and advocacy organizations, with seminar series to integrate theory and practice. Material fee, \$20. (Summer)
- 255 **Interdisciplinary and Interagency Services Coordination for Special Populations (3)** Mazur and Staff
Overview of models and strategies for coordinating services across disciplines and among school and community agencies for special populations. Emphasis

on interdisciplinary team coordination, communication, decision making, planning, and follow-up for individuals with disabilities. Material fee, \$25. (Fall and spring)

- 256 **Curriculum-Based Methods for Individuals with Disabilities** (3) Staff
Curriculum-based design, implementation, and modification for individuals with disabilities; methodology for individualized programming. Material fee, \$25. (Summer)
- 260 **Developmental Assessment in Special Education** (3) Castleberry
Examination of formal psychoeducational tests used with preschool and elementary-school-aged children. Development of formal and informal assessment techniques. Introduction to the skills necessary to write psychoeducational reports. Material fee, \$40. (Fall, spring, and summer)
- 261 **Practicum: Methods and Materials for Young Children with Disabilities** (3 or 6) Jarrett, Castleberry
Clinical practice in design and implementation of educational strategies and materials, including designing and developing teaching materials, classroom teaching, feedback and evaluation with professor. A seminar accompanies this clinical experience. (Fall, spring, and summer)
- 262 **Formal Assessment of Young Children with Disabilities** (3) Castleberry
Weekly seminar designed to prepare early childhood special educators to translate formal assessment data into instructional programming. Requires fieldwork with children. Material fee, \$40. Prerequisite: SpEd 260 or equivalent. (Spring)
- 263 **Development of the Infant with Special Needs** (3) Jarrett
The processes of normal infant development and interrelationships among areas of development; relationship of these processes to the growth and development of infants with or at risk for developmental disabilities. Material fee, \$25. (Fall)
- 264 **Educational Implications of Medical and Genetic Conditions of the Developmentally Delayed Child** (3) Freund
Specialized programs, techniques, and methods for teaching children with developmental delays or disabilities; emphasis on genetically linked disabling conditions. Practitioner needs and programming concerns are stressed. Material fee, \$25. (Spring)
- 265 **Clinical Experience with Young Children with Developmental Disabilities** (3) Castleberry
Field experience and accompanying seminar for students with limited experience in early childhood special education. Intensive involvement in an early childhood special education setting. (Summer)
- 266 **The Development of Language in Young Children** (3) Jarrett, Mazur
Introduction to the study of language acquisition and the development of language programs. Material fee, \$10. (Fall, spring, and summer)
- 267 **Instructional and Assistive Technology in Early Childhood Special Education** (2 or 3) Jarrett
Assistive technology and its implications and uses for very young children (0-5 yrs) in a wide variety of environments. Lectures, laboratory, and demonstrations. Material fee, \$25. (Summer)
- 268 **Development of Young Children with Disabilities** (3) Freund, Mazur
Theories of human growth and development are considered as a framework for examination of typical and atypical development of young children. Material fee, \$25. (Fall, spring, and summer)
- 269 **Etiology, Symptomatology, and Approaches to Intervention with Children with Disabilities** (3) Freund
An in-depth examination of the causes and characteristics of various disabilities. Current principles and approaches to intervention are examined. Material fee, \$25. (Spring)
- 270 **Adapting Attitudes, Programs, and Curriculum for Students with Disabilities in the Mainstream Environment** (3) Staff
Meeting the needs of the special-needs student in the regular classroom. Material fee, \$20. (Spring and summer)
- 271 **Interdisciplinary Approach to Planning for Children with Disabilities** (3 or 6) Jarrett
Interdisciplinary team functioning and service coordination using a systems approach. Organizational development theories, attributes of effective teams, communication, negotiation strategies, and service coordination.

- 272 **Strategies for Inclusion: Addressing Needs of Special Populations (3)** Mazur
This course trains teachers and supervisors to identify and implement strategies by which to successfully include second language learners, students with disabilities, and students with disabilities who are also second language learners in an inclusionary setting so that all teachers can more effectively assume the responsibility to serve all children in our schools. Material fee, \$25. (Fall, spring, and summer)
- 273 **Impact of Culture on Education (3)** Mazur
The impact of culture and ethnicity on educational experiences. The relationship between school culture in the United States, one's own culture(s), and the cultures of diverse populations existing within our schools. Values, norms, rules, ethics, beliefs, attitudes, expectations, and assumptions of various cultures. Material fee, \$25. (Fall, spring, and summer)
- 274 **In-Service Planning and Programming (3)** Staff
The continuing professional development of educators, with focus on the design, implementation, and evaluation of in-service training programs. Material fee, \$25. (Summer)
- 275 **The Culturally and Linguistically Diverse Student with Disabilities: Policy, Research, and Trends (3)** Mazur
Issues regarding educational service delivery for the culturally and linguistically diverse student. National, state, and local policies; current research in bilingual education, special education, and bilingual special education. Appropriate assessment techniques, accessing community resources, and characteristics and needs of language-minority students and their families. Same as TrEd 275. Material fee, \$25.
- 276 **Academic and Psychosocial Assessment of the Culturally and Linguistically Diverse Student (3)** Mazur
Issues and implications of second-language learning; the relationship between learning disabilities and problems related to adaptation to a different culture. Students review and evaluate formal and nonformal assessment measures and administer bilingual assessment materials. Same as TrEd 276. Material fee, \$25.
- 277 **Teaching the Culturally and Linguistically Diverse Student with Disabilities: Methods, Materials, and Classroom Management (3)** Mazur
Commonly used tests, formal and informal assessment strategies and prereferral interventions, and curricular and classroom management strategies for use with bilingual students who have special needs. Instructional adaptations designed to meet cultural, linguistic, and academic needs in both mainstream and special classes. Material fee, \$25.
- 278 **Internship: Educational Intervention for the Culturally and Linguistically Diverse Student with Disabilities (3 to 6)** Staff
Supervised internship. Students learn to write culturally relevant IEP programs, conduct effective parent interviews, and relate assessment findings to productive programming. Material fee, \$15 per credit hour.
- 279 **Dynamics of Interaction: The Essence of Relationships Between Teachers and Students (3)** Staff
An examination of philosophical and psychological theory germane to understanding the nature of human interaction between teachers and students. Material fee, \$25. (Fall)
- 280 **Developmental Assessment of Adolescents (3)** Staff
Formal and informal psychoeducational assessment; assessment instruments commonly used with upper-elementary, junior, and senior high school students; the writing of psychoeducational reports. Material fee, \$35. (Spring)
- 281 **Internship in Teaching Children with Emotional and Behavioral Disabilities: Assistant Teacher (3 to 6)** Hess, Jackson
A full-time teaching experience with children with emotional disturbance. Graduate students assist in implementing psychoeducational assessment and teaching practices. Daily guidance by on-site training teachers and weekly supervision by University clinical faculty. Weekly seminar accompanies this internship. Material fee, \$45. (Fall)
- 282 **Internship in Teaching Children with Emotional and Behavioral Disabilities: Co-Teacher (3 to 6)** Hess, Jackson
Continuation of SpEd 281. Graduate students become the primary teaching team in the classroom with ongoing supervision. Graduate students plan and

apply psychoeducational teaching strategies with children with emotional disturbance. Refinement of instructional and behavior management strategies through the full-time teaching experience. Weekly seminar continues. Material fee, \$45. (Spring)

- 283 **The Urban Setting and Its Impact upon Children with Emotional and Behavioral Disabilities (3)** Jackson

The cultural differences and ethnic complexities that face minority children in urban schools. Effects of the total environment in which inner-city children live on their ability to learn, feel, and behave. Material fee, \$25. (Fall)

- 284 **Preparation for Internship in Teaching Adolescents with Emotional and Behavioral Disabilities (3)** Staff

Review and refine program theory and skills of the psychoeducational theory prior to internship. Material fee, \$10. (Spring)

- 285 **Teacher as Consultant: Inclusion of Adolescents with Emotional and Behavioral Disabilities (3)** Hess

Skills and insights pertaining to the consultation process between special education and regular classroom professionals. Consultant process viewed in an ecological systems orientation. Material fee, \$35. (Spring)

- 288 **Characteristics of Emotional and Behavioral Disabilities: Infancy Through Adolescence (3)** Staff

An in-depth examination of normal growth and development, psychiatric diagnostic categories, psychosocial development issues, and the nature and needs of the student with serious emotional disturbance. May be repeated for credit. Material fee, \$30. (Fall)

- 289 **Curriculum and Instructional Strategies for Adolescents with Emotional and Behavioral Disabilities (3 to 6)** Staff

Design, adaptation, and implementation of instructional methods and materials. Material fee, \$25. (Fall)

- 290 **Affective Development and Behavior Management in Special Education (3)** Castleberry and Staff

Theory, programming, and behavior management strategies from theoretical and practical points of view. Material fee, \$25. (Fall and spring)

- 291 **Behavior Management Practicum: Adolescents with Emotional and Behavioral Disabilities (3)** Staff

Field-based examination of theory of behavior development and techniques for classroom management. Material fee, \$25. (Summer)

- 292 **Internship: Teaching Young Children with Disabilities (3 or 6)** Castleberry, Browne

Supervised internship in early childhood special education. Weekly seminar. Material fee, \$15 per credit hour. (Spring and summer)

- 293 **Internship: Early Intervention (3 to 6)** Jarrett

Supervised internship in early intervention. Weekly seminar. Material fee, \$15 per credit hour. (Spring and summer)

- 294 **Internship: Teaching Adolescents with Emotional and Behavioral Disabilities (6 to 9)** Hess, Jackson

Full-time placement as a psychoeducator in various roles and sites. Material fee, \$90. (Fall, spring, and summer)

- 295 **School- and Community-Based Internship in Special Education and Transition (1 to 9)** Leconte, Taymans

A 50- to 450-hour supervised internship in school- and community-based settings involved in career, vocational, and transition services. (Fall, spring, and summer)

- 296 **Teaching Internship in Transition Special Education (3 to 6)** Kochhar, West, Taymans

Supervised teaching internship; seminar required. Permission by instructor. Material fee, \$15 per credit hour. (Fall, spring, and summer)

- 297-98 **Research and Independent Study (1 to 3)** Shotel

Individual study or research under guidance of staff member. Admission by permission of advisor. May be repeated for credit.

- 301 **Research Seminar in Special Education (arr.)** Kochhar

Participation in a small group with a selected faculty member; research on and discussion of an area of common interest. Admission by permission of instructor. (Summer)

- 303 **Administration and Supervision of Special Education (3)** West and Staff
Philosophy and nature of special education; program organization, administration, and development. Surveying local needs; program evaluation and supervision. Admission by permission of instructor. Material fee, \$25. (Spring)
- 304 **Recent Research and Trends in Special Education (3)** Taymans, Kochhar
Emphasis on topical research issues, problems of conducting research, and procedures and sources for obtaining research funding. Material fee, \$25. (Fall and spring)
- 308 **Instructional Processes in Teacher Preparation and Special Education (3)** Kochhar
Philosophical and methodological aspects of staff development and university programs; opportunities for practice in needs assessment, program design, and instruction. Admission by permission of instructor. Same as TrEd 308. Material fee, \$20. (Spring)
- 309 **Supervising the Preservice Clinical Experience (3)** Tate, Hall
An investigation of the complex process of clinical supervision as it relates to the professional growth and development of practitioners at the preservice level. Focus on interpersonal/social dimensions and the process of instructional supervision. (Fall)
- 343 **Psychoeducational Diagnosis in Special Education (3)** Staff
The range of diagnostic and intervention strategies applicable to the student who presents psychosocial and related learning difficulties. Admission by permission of instructor. Material fee, \$25. (Spring)
- 345 **Consultation Skills in Teacher Preparation and Special Education (3)** West
Consultation models from organizational development, organizational psychology, and mental health applied to professional practice in education and special education. Material fee, \$25. (Spring)
- 352 **Seminar: Legal Issues and Public Policy Concerns for Individuals with Disabilities (3)** Kochhar
Overview of current legislation and public policy affecting education, employment, and civil rights of individuals with disabilities. The evolution of disability policies and their relationship to principles of social justice. Material fee, \$25. (Fall)
- 353 **Post-Master's Internship in Special Education (3 to 6)** Freund, Mazur, Kochhar, Shotel
Supervised professional internship in college teaching, administration, supervision, research, or policymaking. Internships are individually arranged. Admission by permission of instructor. (Fall, spring, and summer)
- 354 **Doctoral Internship: Special Education (3 to 6)** Freund, Kochhar, Mazur, Shotel
Supervised professional internship in college teaching, administration, supervision, research, policymaking, or private agency function. Each internship is individually arranged. Admission by permission of advisor. (Fall, spring, and summer)
- 360 **Interdisciplinary Techniques in the Diagnostic Process in Special Education (3)** Jarrett
Application of theoretical concepts of assessment; development of assessment programs; interpretation and application of interdisciplinary diagnostic evaluations. Prerequisite: SpEd 260 or equivalent, and permission of instructor. Material fee, \$25. (Fall)
- 370 **Attitude Change and the Access Process (3)** Castleberry
Consideration of psychosocial constructs germane to the role of the consultant/administrator in educational and interdisciplinary settings. Application of theory in accessing human service delivery systems. Material fee, \$25. (Fall)
- 390 **Doctoral Seminar in Special Education (3 to 6)** Shotel
Review of literature in a topical area; preparation of a dissertation proposal and a manuscript of publishable quality. Admission by permission of instructor and approval of major advisor. Material fee, \$25. (Fall)
- 391 **Dissertation Research (arr.)**
Prerequisite: SpEd 390.

TELECOMMUNICATION

Professors C.H. Sterling (*Director*), G. Brock

Associate Professor D.M. Kennet

Adjunct Professor R.J. Oslund

Professorial Lecturers L. Darby, R.S. Belous, A. Barna

Associate Professorial Lecturers J.C. Reed, R.J. Frank

Columbian College of Arts and Sciences, in cooperation with the School of Engineering and Applied Science, offers a multidisciplinary program leading to the degree of Master of Arts in the field of telecommunication. The program focuses on the interaction among technology, economics, management, and both corporate and governmental policy-making in the common carrier and media industries.

Master of Arts in the field of telecommunication—Prerequisite: a bachelor's degree with a B average from an accredited college or university

Required: the general requirements stated under Columbian College of Arts and Sciences, including at least 36 credit hours of course work. Required courses for the degree include Econ 217 and 249; TCom 201, 202, 211, 212, 230, 231, 240, 259; and two electives selected with a faculty advisor, typically chosen from TCom 220, 224, 235 and Mgt 282. Each student must pass a Master's Comprehensive Examination. A thesis option is available.

- 201 **Development of the Telecommunication Industry** (3)
Development of telecommunication technology, industry, and policy in the United States, stressing interrelationships among industry, government bodies and policies, and users.
- 202 **International Telecommunication Policy** (3) Kennet
Major issues in telecommunication policy in countries around the world: competition and universal access policies; the role of telecommunication in economic development; multinational organizations with a role in telecommunication; free flow of information issues; use of orbital and spectrum resources.
- 207 **National Security Issues in Telecommunication** (3) Oslund
Policy problems created by the vulnerability of telecommunication and computer networks to accidental or intentional attacks; dependence of economic and military security on telecommunication networks; information warfare; privacy and surveillance; international trade and information security.
- 211 **Telecommunication Technology** (3) Staff
Introduction to analog and digital systems for the transfer of information; systems to modulate, multiplex, and code information for transmission; noise and bandwidth as limits to capacity and system performance; examples from television and radiobroadcasting, telephone, satellite, and mobile radio systems.
- 212 **Telecommunication Systems and Networks** (3) Staff
Design and optimization of analog and digital telecommunication systems; transport, switching, access, and control for circuit, message, and data switched networks; application to cellular radio, satellite broadcast, broadband data, other telecommunication systems. Prerequisite: TCom 211 or permission of instructor.
- 220 **Technology and Telecommunication Policy** (3)
National and international policy issues that arise from the interaction between scientific and technological development in the telecommunication industry and government policies. Prerequisite: TCom 201.
- 224 **Telecommunication Regulation** (3)
Background, current status, and trends in regulation of common carriers and electronic media. Legislative, FCC, and judicial decisions and trends. Emphasis on the process of federal regulation, with case studies. Prerequisite: TCom 201.
- 230 **Principles of Telecommunication Management** (3)
Fundamentals of daily telecommunication operations, including human factors in organizations, acquisition and procurement, research and development, logistical planning, and relations with carriers and manufacturers.
- 231 **Telecommunication Management and Marketing** (3)
Strategic planning in regulated and competitive telecommunication industries; managing and marketing a technology-based business; different management and marketing approaches and their strengths and weaknesses; legal constraints; responsibilities and ethics. Prerequisite: TCom 230.

- 235 **Telecommunication Finance (3)**
Principles and methods of asset valuation; measurement and interpretation of financial flows; financial statements; risk assessment; capital markets; capital budgeting; effects of economic regulation on capital formation. Prerequisite: Econ 217 or permission of instructor.
- 240 **Seminar in Domestic Telecommunication Policy (3)**
Interaction of private and public policy in telecommunication: research and development, market entry, competition, ownership and acquisition, regulation, business decisions, and social impact. The course is intended for degree candidates in their final year of study in the telecommunication program.
- 259 **Applications of Economics in Telecommunication (3)**
Structure, interrelationship, and function of the telecommunication industry within a changing regulatory framework. Prerequisite: Econ 249.
- 297 **Special Topics (3)**
Special topics in technology, economics, operations, or policy. May be repeated for credit once provided the topic differs. Prerequisite: TCom 201 and permission of instructor.
- 298 **Independent Study (1 to 3)**
Prerequisite: permission of instructor.
- 299-300 **Thesis Research (3-3)**

THEATRE AND DANCE

Professors M.R. Withers, A.G. Wade, L.B. Jacobson (*Chair*), N.C. Garner
Associate Professors W.A. Pucilowsky, C.F. Gudenius
Assistant Professors B.W. Sabelli, M.A. Buckley

Master of Fine Arts in the field of classical acting—Columbian College of Arts and Sciences, in cooperation with the Shakespeare Theatre Academy for Classical Acting, offers the Master of Fine Arts in the field of classical acting. The program is an intensive endeavor intended for students who have had extensive theatre training as part of their undergraduate preparation or have spent several years after completing college as working professionals in the field.

Required: The general requirements stated under Columbian College of Arts and Sciences. The 50-credit-hour degree program is taken in four intensive sessions over a 12-month period.

Master of Fine Arts in the field of theatre with a concentration in theatre design—Prerequisite: the degree of Bachelor of Arts from this University, or an equivalent degree.

Required: the general requirements stated under Columbian College of Arts and Sciences. The program of study consists of 54 credit hours of 100- and 200-level course work in theatre and dance and in art, planned in consultation with the advisor, including a creative thesis (TrDa 299-300). The program may be planned to emphasize scenery, lighting, and costume.

For listings of 100-level courses, see the Undergraduate Programs Bulletin.

Departmental prerequisite: Prerequisite to TrDa 201 through 229: degree candidacy in the M.F.A. in the field of classical acting. Prerequisite to all other 200-level courses: M.F.A. candidacy or permission of instructor.

201-4 Acting (2 or 3 each)

The focus of the acting sequence shifts with each session, providing a studio structure to explore and meet the demands of the classical canon. Portions of the sequence focus on the history plays and tragedies, classic comedy, high comedy, the Jacobean, and master classes.

205-8 Topics in Classical Drama and Culture (1 or 2 each)

Plays and other writings from the Elizabethan, Jacobean, and Restoration eras and the 18th century. The historical world in which the plays were written as well as the imaginary worlds created in the plays themselves.

209-10 Text (2-2)

Textual analysis emphasizing development of aesthetic expression. The forms and rules of verse: its meter, scansion, and overall structure in the early, middle, and late Shakespeare plays, as well as the intricacies of the prose.

- 211-14 **Voice and Speech** (2 or 3 each)
The development of clear, supported speech and sound that can meet the demands and challenges of classical texts. Resonators, articulators, breathing, and placement; phonetics and ear training; defining the character through the voice.
- 215-18 **Movement** (1 or 2 each)
The development of an awareness of the body and its expressive abilities through an integrated approach that includes ballet, modern dance, Hatha Yoga, and Feldenkrais for coordination, focus, and expression.
- 219-22 **Alexander Technique** (1 or 2 each)
Through group work and individual sessions, students develop a further awareness of the body toward expression of imagination and the creative process, enabling powerful characterization without stress or personal physical distortion.
- 223-24 **Stage Combat** (2-2)
Skills in stage combat techniques, including unarmed combat and broadsword, buckler, rapier, dagger, and other lighter weapons, toward development of greater physical strength and an awareness of safety issues. The course is designed to lead to certification as an actor/combatant through the Society of American Fight Directors.
- 225-28 **Practicum** (arr.)
This sequence of courses includes scene preparation, rehearsal/production, clown class, and other performance skills.
- 229 **Audition Techniques** (1)
A set of workshops to help students develop strong audition skills. Business aspects of acting, such as selection of agents, Equity status, and taxation issues. The workshop concludes with a showcase performance for casting directors, agents, and theatre directors.
- 231 **Lighting Design** (3) Gudenius
Theory and execution of lighting design for theatre and dance. Prerequisite: TrDa 131. May be repeated for credit. (Spring)
- 233 **Architecture of Theatre and Exhibit Spaces** (3) Sabelli
Theatrical architecture from a historical perspective. Traditional and nontraditional exhibit, theatrical, and assembly spaces are examined and evaluated with reference to the functional use of space from practical, architectural, and aesthetic perspectives. Studio work includes design of a hypothetical performance space and its auxiliary units.
- 234 **Scene Design: Renderings** (3) Sabelli
Preparation for the advanced student designer, with emphasis on the individual development of rendering techniques including computer graphics, practical design applications, traditional script analysis, and original scenographic interpretations. May be repeated once for credit. (Fall, even years)
- 235 **Scene Design: Model Making** (3) Sabelli
Exploration of all styles of traditional and contemporary scenography through the making of scale models. May be repeated once for credit. Admission by permission of instructor.
- 236 **Intermediate Costume** (3) Pucilowsky
Introduction to the basic techniques of costume design through specific projects. Various rendering techniques will be explored, consistent with the historical period concerned. May be repeated for credit. Prerequisite: TrDa 136. (Spring, odd years)
- 237 **Advanced Costume** (3) Pucilowsky
Study of special design, style, and construction problems. May be repeated for credit. (Fall and spring)
- 238 **Pattern Making** (3) Pucilowsky
The study of pattern drafting and draping methods, based on contemporary and historical clothing, through lecture and class work. Prerequisite: TrDa 136. (Spring, even years)
- 241 **Production Drafting** (3) Gudenius
Development of drafting skills for production: groundplans, elevations, sections, perspectives, etc.
- 246 **Scene Painting** (3) Gudenius
Development of the skills of painting needed for the reproductive craft of theatrical painting.

- 291 **Internship (3 or 6)** Staff
Internships with theatre companies or arts organizations, including conference and/or seminar. May be taken for a total of 6 credit hours.
- 292 **Selected Topics (1 to 3)** Staff
May be repeated for credit.
- 294 **Independent Research (arr.)** Staff
May be repeated for credit.
- 299-300 **Thesis Research (3-3)** Staff

TOURISM AND HOSPITALITY MANAGEMENT

Professor D.E. Hawkins

Associate Professors D. Frechtling (Chair), L. Yu, L.A. Delpy Neirotti, S.E. Spivack, M.V. Smith

Assistant Professor M.W. Lonam

Assistant Professorial Lecturer E. Zavian

See the School of Business and Public Management for programs of study leading to the degree of Master of Tourism Administration and Master of Business Administration. For further information on the five-year, dual-degree program leading to the Bachelor of Business Administration and Master of Tourism Administration, see the Undergraduate Programs Bulletin.

- 220 **International Hotel Management (3)** Yu
The study of multinational hospitality operations, with emphasis on U.S. corporate involvement in and planning for overseas expansions. Political, economic, cultural, financial, and legal aspects inherent in the international business environment. (Fall)
- 230 **Organization and Management of Airlines (3)** Staff
Overview of domestic and international passenger air transportation systems. Analysis of planning, financing, operating, marketing, and evaluating airline transportation systems. Legal and regulatory aspects of airline operations. Development of infrastructure and related support services. (Fall)
- 249 **Economic, Cultural, and Environmental Aspects of Tourism (2)** Spivack
Relationship of tourism and sustainable development; specific emphasis on cultural, environmental, and economic impacts and trends. (Fall and spring)
- 250 **Administration of Tourism and Hospitality Services (2)** Frechtling
Organization and management concepts, theory, and issues, stressing application of theory through analysis of case examples drawn from the tourism and hospitality industry. Prerequisite TStd 104 or equivalent. (Fall)
- 251 **Statistical Applications in Tourism/Hospitality Management (2)** Yu
Application of quantitative methods in tourism and hospitality management research. Procedures and methodology for collecting data, summarizing and interpreting data, and drawing conclusions based on the data. (Fall)
- 260 **Tourism Development (3)** Frechtling
Relationship of economic theory and planning principles to tourism development; application of pre-feasibility analysis to tourism projects. (Spring)
- 261 **Tourism Planning (3)** Staff
Integrated planning for tourism organizations; development of comprehensive tourism projects; consideration of basic concepts, approaches, and models. (Spring)
- 262 **Tourism Policy Analysis (3)** Staff
Components of tourism policy, including development of tools for tourism policy analysis and description of tourism organizations in the government and private sector. (Spring)
- 263 **Tourism Marketing (3)** Frechtling
Concepts and techniques employed in marketing travel industry products and services, including its public- and private-sector components. Assessment of the tourism product, development of marketing strategy, preparation of marketing plan, and analysis of promotional programs. (Fall)
- 264 **Sport Marketing (3)** Delpy Neirotti
Application of marketing theories to sport events and properties. Case examples of marketing athletes, facilities, sport products, and events as well as using sports as a marketing tool for products. Writing sponsorship and endorsement

- proposals and incorporating sport into an integrated marketing plan. Prerequisite: MBAd 230 or equivalent. (Fall)
- 265 Sport Law: Contracts and Negotiations (3)** Zavian
Examination of legislation and specific case law as related to professional and amateur athletes, sport events, licensed merchandise, broadcast and sponsorship rights. Topics include labor and anti-trust law; contract negotiation, specifications, and interpretation. (Fall)
- 270 Tourism Research (2)** Frechtling
Sample survey specific research methods and their application to the study of tourism. (Spring)
- 277 Event Management (3)** Staff
An introduction to the theoretical and practical foundations of event management. Fundamentals of planning, budgeting, and evaluating events. (Fall)
- 278 Conference and Exposition Management (3)** Staff
Site selection, program planning and management, exhibits, selection and use of facility, volunteers, and budget management. (Spring)
- 280 Advanced Workshop (1 to 6)** Staff
Workshops with emphasis on contemporary issues and opportunities; development of advanced professional competencies. May be repeated for credit with permission of advisor. (Fall, spring, and summer)
- 282 International Experience (1 to 6)** Staff
Travel to a foreign country for study of specific topics. May be repeated for credit with approval of advisor. (Fall, spring, and summer)
- 283 Practicum (3)** Staff
For graduate students enrolled in a degree program or field offered through the department. Fieldwork, internship, and/or instructional practice, including conference and/or seminar. May be repeated once for credit with permission of advisor. (Fall, spring, and summer)
- 290 Special Topics (1 to 3)** Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit.
- 296 Travel Information Management Systems (3)** Spivack
Database utilization, information analysis, reservation systems, computer applications including the Internet, and related travel management systems. (Spring)
- 297 Advanced Topical Studies (3)** Hawkins
Required capstone experience for tourism administration students who do not select the thesis option. Analysis of case situations involving policy formulation or management decision making; emphasis on applied strategic planning and management approaches.
- 298 Directed Reading and Research (1 to 3)** Staff
Supervised readings or research. Admission by prior permission of instructor. May be repeated for credit.
- 299 Thesis Seminar (3)** Staff
- 300 Thesis Research (3)** Staff

UNIVERSITY PROFESSORS

University Professors A. Etzioni, P.J. Caws, S.H. Nasr, K.F. Schaffner, J.N. Rosenau

Courses numbered in the 770s and 780s are taught by distinguished scholars who hold appointments as University Professors. With the approval of the department or program concerned, appropriate University Professor courses may be taken to satisfy degree program requirements. Permission of the University Professor may be required for enrollment. A complete listing of courses offered each semester appears in the *Schedule of Classes* under the 700 series. Following is a list of courses that are expected to be taught fairly regularly by University Professors.

IAff/PSc

- 770 Turbulence in World Politics (3)** Rosenau
An effort to probe the sources and dynamics of change and continuity in local, national, and international affairs. The links between the orientations of individuals and the actions of collectivities are a major focus, along with the foundations

of authority under transformative conditions. For graduate students; open to upper-level undergraduates.

IAff/PSc

771 Political Aggregation (3)

Rosenau

An exploration of how collective action is fashioned out of the input of individuals, how collectivities become larger than the sum of their parts, and how political organizations manage to persist through time. Socialization, mobilization, momentum, and bandwagon effects are among the concepts evaluated. For graduate students; open to upper-level undergraduates.

IAff/PSc

772 The Dynamics of Globalization (3)

Rosenau

An inquiry into the economic, cultural, and political processes through which individual and community life is expanding as awareness encompasses factors on a global scale. The consequences of this expansion at both global and local levels is examined, along with the possibility that these levels interact. For graduate students; open to upper-level undergraduates.

IAff/PSc

773 Global Governance (3)

Rosenau

An inquiry into the prospects for and problems of governance on a global scale in the era following the end of the Cold War. Informal forms of governance as well as those that have undergone institutionalization are assessed. For graduate students; open to upper-level undergraduates.

HmSc

771 The Cinema of Morals/The Morals of Cinema (3)

Caws

Vicarious moral experience in the cinema; examples of such experience in film and the moral arguments they provoke; the power of cinema as a shaper of moral sentiment; moral issues in the production and distribution of films. For graduate students; open to undergraduates.

Phil

772 Individualism (3)

Caws

The concept of the free individual in philosophy, psychology, literature, and politics; individuals and groups; individualism and collectivism; exemplary individuals in biography, autobiography, and fiction; problems of individual and collective agency and identity. For undergraduates; open to graduate students.

Phil

774 Understanding Technology (3)

Caws

The idea of technology—its relation to the sciences and the arts and humanities, its development, and its problems. Technology will not be regarded as merely dependent on the sciences or as merely useful (or dangerous) but as a human activity in its own right, with its own history, conceptual structure, interests, risks, and benefits. For undergraduates; open to graduate students.

Phil

778 Left and Right in Philosophy and Politics (3)

Caws

A fundamental inquiry into the concept of the state in terms of entrenched oppositions: individualism/collectivism, equality/liberty, liberalism/conservatism, socialism/free enterprise, communism/capitalism. Emphasis on the present need to find a constructive transcendence of these oppositions. For graduate students; open to undergraduates.

Phil

779 Philosophy and Psychoanalysis (3)

Caws

An exploration of some striking parallels between the topics addressed by Freud's psychoanalytic theories on the one hand and the traditional content of philosophical reflection on the other, with special emphasis on the relation between cognitive theory and therapeutic practice (in both disciplines). For graduate students; open to undergraduates.

HCS/Phil

770 **Philosophy of Medicine (3)**

Schaffner

An introduction to philosophical issues in medicine, including scientific progress, the doctor-patient relationship, whether diseases are objective or socially conditioned entities, clinical reasoning using some simple examples from medical diagnosis and new drug testing, and ethical and social issues raised by the AIDS epidemic. For undergraduates; open to graduate students.

Phil

771 **Philosophy of Biology (3)**

Schaffner

An introduction to philosophical issues in biology, including evolutionary biology, molecular biology and reductionism, teleology, experimental objectivity, philosophical implications of the neurosciences, sociobiology, and evolutionary ethics. For undergraduates; open to graduate students.

HCS/Phil

775 **Ethics and Health Policy (3)**

Schaffner

The problem of health care reform and ethical issues associated with managed care and competition, Medicare and Medicaid reform, and the issue of health care rationing. Issues relating to the "right to die," including active and passive euthanasia and physician-assisted suicide. For graduate students; open to undergraduates.

HCS/Phil

777 **The Human Genome Project: Ethical, Legal, and Social Implications (3)**

Schaffner

Ethical, legal, and social implications of the decoding of the entire human genome, including confidentiality of genetic information, genetic discrimination and insurance, reductionistic/deterministic implications, forensic issues, research ethics, gene therapy and patenting, and cloning. For graduate and medical students; open to undergraduates.

HCS/Phil

780 **Neurobiology and Reductionism (3)**

Schaffner

Recent developments in neuroscience and theories of consciousness, including neural networks; philosophical implications, including the relations among genetics, brains, and behavior. For graduate students; open to qualified undergraduates.

Rel

770 **Islamic Civilization and the West (3)**

Nasr

The encounter of Islam and the West, from the rise of Islam to modern times. Investigation of the impact of Islam on European philosophy, science, art, and literature; influence of the West and Western scholarship on the Islamic world. For juniors and seniors; open to graduate students.

Rel

771 **Persian Sufi Literature in East and West (3)**

Nasr

The writings of major Persian Sufi poets and writers, such as Khayyam, Attar, Rumi, Shabistari, and Hafiz, and their impact on the West and on India. The translation of these works into European languages and their influence upon such figures as Goethe and Emerson are discussed. Assigned readings in English. For undergraduates; open to graduate students.

Rel

772 **Mysticism—East and West (3)**

Nasr

A thematic examination of mystical traditions: the nature of mysticism, the search for ultimate reality, the mystical significance of the cosmos, the mystical science of the soul, and the significance of sacred art and symbols. Major mystical traditions of East and West—Hinduism, Taoism, Buddhism, Judaism, Christianity, Islam. For undergraduates; open to graduate students.

Rel

773 **Perennial Philosophy (3)**

Nasr

The idea of perennial philosophy as developed in the 20th century by A. Huxley, A.C. Coomaraswamy, and others. Doctrines and teachings of perennial

philosophy as found in various religious and philosophical traditions of East and West. Prerequisite: at least one course in religion, philosophy, or intellectual history. For undergraduates; open to graduate students.

Rel

775 Man and the Natural Environment (3)

Nasr

The religious, philosophical, and scientific causes of the present environmental crisis. The history of religious and philosophical attitudes toward nature in the West, in the history of Western science, and in some non-Western world views that may encourage a more harmonious relationship between man and the natural environment. For undergraduates; open to graduate students.

Rel

777 Religion and Science (3)

Nasr

The interaction between religion and science in ancient Egypt, classical Greece, Islam, India, China, and the West, from the Renaissance, the scientific revolution, and up to the present day. Key concepts and issues in the encounter of religion and science in light of the cultural matrix of the civilization and period in question. For juniors and seniors; open to graduate students.

Soc

776 Public Policy Research (3)

Etzioni

Basic concepts of policy research in comparison to basic and applied research. Policy research methods. The social structure of policy research: producers and consumers of knowledge and issues arising among them. Open to undergraduates and graduate students with permission of the instructor. Prerequisite: social science or public policy course work or related experience.

PSc/Soc

777 Contemporary American Society (3)

Etzioni

A social science perspective of contemporary American society. Analysis of concepts that allow continued insight into America's condition and future. Institutions examined include the family, schools, communities, the polity, and relations among racial/ethnic groups. For graduate students; open to undergraduates.

Soc/Econ/PSc

779 The Elements of Socioeconomics (3)

Etzioni

A synthesized approach to the study of economic behavior and economic policy, drawing on relevant segments of economics and sociology as well as political science and psychology. A discussion of ethical assumptions and core concepts in the study of micro- and macroeconomic behavior and their policy implications. For graduate students; open to qualified undergraduates.

Soc/PSc/IAff

781 Elements of Communitarian Thinking (3)

Etzioni

An examination of the roots of communitarian thinking in earlier philosophical work, current political theory, and historical and contemporary sociology. The relevance of communitarian thinking to various community-building social movements. For graduate students; open to undergraduates with permission of instructor.

Soc/PSc/IAff

782 Elements of Public Policy in Communitarian Perspective (3)

Etzioni

The issues that arise when communities seeking to advance their goals run into commitments to individual and minority rights. Freedom of speech and hate codes, public safety and protection against search and seizure, majority votes and minority rights, and other policy issues. For graduate students; open to undergraduates with permission of instructor.

VIRGINIA CAMPUS

With an emphasis on graduate education and research, The George Washington University offers academic programs on its Virginia Campus. The School of Engineering

and Applied Science, School of Business and Public Management, and Graduate School of Education and Human Development offer graduate study leading to master's and doctoral degrees at this site. The Virginia Campus offers extensive library and research facilities networked by computer to information databases nationwide.

Through the School of Business and Public Management and the Graduate School of Education and Human Development, the three executive programs outlined below are offered on the Virginia Campus. In addition, the School of Engineering and Applied Science offers course work leading to master's and doctoral degrees in several fields, including an accelerated weekend program leading to the Master of Science in the field of telecommunications and computers.

Academic programs on the Virginia Campus are extensive and growing. Please note that programs listed here include only those that are exclusive to the Virginia Campus. Programs offered at this and other sites are listed by academic department. Contact the Virginia Campus office for complete information on programs at this site.

EXECUTIVE MASTER OF SCIENCE IN INFORMATION SYSTEMS TECHNOLOGY

Executive Master of Science in Information Systems Technology—A unique, weekend-oriented program for high-potential, mid-level managers and senior executives, offered by the School of Business and Public Management. The 36-credit-hour multidisciplinary curriculum focuses on the role of information systems and behavioral and decision sciences in problem solving and decision making. The program is designed to meet the needs of individuals from a variety of professional and educational backgrounds. Applicants generally are expected to have a minimum of seven years of professional experience and a bachelor's degree with a B or better average from an accredited college or university. Program participants represent a broad range of public and private sector organizations; they hold positions that include president, senior marketing specialist, division director, senior engineer, program manager, and consultant.

The program enrolls one student cohort per year, which undertakes a fixed sequence of courses during the 15-month accelerated program. Classes meet on alternating Fridays and Saturdays. The faculty consists of a core of full-time professors, augmented by recognized leaders in particular disciplines and distinguished guest lecturers from government and industry.

The management science courses listed below are offered at the Virginia Campus only and are available to Executive Master's students only.

MANAGEMENT SCIENCE

401 Individual and Group Decision Processes (3)

Study of the individual and group processes in decision making in organizations. Topics include decision effectiveness, decision analysis techniques, risk analysis, and managerial style as related to decision making.

402 Quantitative Methods for Information Systems (3)

Introductory study of quantitative techniques for problem solving. Statistical concepts, including confidence intervals, hypothesis testing, correlation, and regression. Linear programming. Applications and case studies involving management information systems.

404 Enterprise Networks in Organizations (3)

The role of data communications and networking within organizations. LANs and interconnecting LANs to create enterprise networks. Emerging technologies such as videoconferencing, multimedia, and ATM. The interaction between networks and MIS as typified by client-server architectures is emphasized.

405 Database Systems (3)

Application and implementation of database management systems in the public and private sectors. Database organization, creation, maintenance, and management. Client-server technology. Review of commercial database management systems.

406 Decision Support Systems and Methods (3)

Computer-based decision-making aids and simulations. Issues in effective implementation of decision support systems. Review and analysis of various expert systems, including tools and generators, classification vs. diagnostic type systems, and building modules. Design of decision support and expert systems.

- 407 **Introduction to MIS Business Relationships (3)**
Introduction to MIS business solutions. Integration of MIS into the business and organizational environment. Case studies of various organizational structures and MIS needs and solutions. Economic analysis of MIS applications.
- 408 **Strategic Planning and Business Process Engineering (2)**
Development and implementation of a long-range organizational strategy. Business process engineering and re-engineering. Technology assessment and technical management, use of critical success factors. Innovative uses of MIS in organizations.
- 410 **Information Systems Security (2)**
Network and MIS security issues. Risk assessment, technological and procedural security measures. Computer fraud and privacy issues. Hacker attacks, phone fraud, denial of service, and virus and work attacks.
- 411 **Information Systems Design (4)**
Introduction to the design and analysis of information systems. The systems development life cycle, analysis of requirements, design of logical systems, analysis and design of user interfaces, system documentation and specifications. Planning for system implementation, evaluation, and maintenance.
- 412 **The Information System Development Process (2)**
Management decisions and activities during the life cycle of an information system. Project estimation and planning for information systems. Contractual issues in system development and acquisition. Requirements analysis, systems analysis, development, testing, and maintenance. Rapid prototyping, spiral model development, and alternative development strategies.
- 490 **Special Topics (1 to 3)**

EXECUTIVE MASTER OF BUSINESS ADMINISTRATION

The *Executive Master of Business Administration* program is specially designed for accomplished managers and senior professionals to enhance their effectiveness as general managers. Participants earn the M.B.A. in 19 months, while continuing to serve their organizations. Class sessions for the 60-credit-hour program are held on alternating Fridays and Saturdays and in three week-long residencies, plus a two-week residency held abroad. The broad curriculum emphasizes general management and follows an integrative approach, spanning the traditional M.B.A. disciplines as well as fields of continuing and emerging importance—strategic management and public policy, international business, management of innovation, new venture creation, information and decision systems. Electives are created for each Executive M.B.A. class, based on their preferences. Classes are limited to approximately 35 experienced individuals who form a cohort, taking all courses together. A new class begins each year in late August.

The courses listed below are available only to degree candidates in the Executive Master of Business Administration program.

- 202 **Organization, Management, and Leadership (3)** Lobuts, Harvey, Winslow
Integrates organizational concepts with management principles and theory applied to public and private organizations. Management thought, functions, and practices. Current management approaches and future challenges. Theories of managerial leadership, leadership issues, and problems in organizations at higher levels.
- 210 **Managerial Economics (3)** Staff
Intermediate-level micro- and macroeconomic theory and its application in public and private-sector decision making. Demand, production, costs, investments, market structure and strategy, and market outcomes. Interpretation of economic conditions and theory and practice of monetary and fiscal policy.
- 212 **Business and Public Policy (3)** Lenn
The political, legal, economic, social, and ethical forces that act on business. Interaction of the market system and public policy process in the development of law and regulation, along with the evolving relationship of business and government in American society.
- 214 **Fundamentals of Decision Science and Computational Methods (3)** Forman
Theory and methods of business decision making, including intelligence, design, and choice. Useful approaches in cases of multiple objectives, compen-

satory and noncompensatory decision approaches, uncertainty and statistics, analytical models, and quantitative and qualitative measurement skills.

- 216 **Marketing Management (3)** Dyer
The marketing process from the firm's viewpoint. Market analysis, product planning, channels of distribution, pricing, and promotion. Approaches to financial, operational, and international market considerations. The impact of environmental and other business forces on marketing practice.
- 220 **Management of Operations and Manufacturing Strategy (3)** Staff
Fundamentals of production and operations management and the associated tools and techniques used in decision making. Resource allocation, inventory management, and production planning and control. Technology-related developments, such as flexible manufacturing systems and computer integrated manufacturing.
- 222 **Financial Accounting (3)** Singleton
The role of accounting in the decision-making process of management and external parties. Interpretation of financial statements for the guidance of management. Interpretation and implementation of financial accounting.
- 224 **Theory and Concepts of Finance (3)** Handorf
Long-term financing and current operations, investment decisions, and dividend policy. Financial analysis, business theory, and policy and practice in financial management. The role of capital formation and the relationship of public policy and the structuring of interest rates.
- 226 **The Changing World Community: Implications for the Global Economy (3)** Lauter
The global competitive framework and how nations develop and sustain competitive advantage. The role of the multinational firm, the economic transformation of the Eastern European nations, and the internationalization of the Japanese economy with reference to the United States.
- 230 **Competitiveness and Corporate Innovation (3)** Donnelly
Business, technological, economic, and political factors influencing the development of new products. Competitiveness and joint ventures, both locally and globally, involving technological innovation and transfer. Enhancing organizational innovation, product concept development, technology marketing, and corporate venture divisions.
- 240 **International Business Strategy and Practice (3)** Staff
The changing international environment and its impact on domestic and foreign multinational corporations. International finance, marketing, strategy, negotiations, and product policies. The economic, cultural, and political aspects that influence market conditions.
- 250 **Financial Decision Making in Firms and Markets (3)** N. Cohen
Decisions made by financial managers about working capital, fixed assets, and sources of financing in the context of world-wide business operations. Examines securities markets from the dual viewpoints of the company as a user of capital and investors as suppliers of capital. The relationship of risk and return and the value of securities.
- 252 **Power, Politics, and Ethics (3)** Kee
Ethical judgments of corporate professionals, managers, and public officials. Problems and alternatives for private and public institutional arrangements to meet the needs of society. Concepts and strategies of ethical analysis are applied to specific problems, such as risk management, plant relocation, and preferential hiring.
- 254 **Managerial Accounting (3)** Lindahl
The role of accounting in the management decision-making process. Costing systems, cost behavior analysis, responsibility accounting, and volume-profit relationships. Budgeting for financial planning and control; pricing and product mix decisions.
- 257 **Entrepreneurship and Creation of New Ventures (3)** Toftoy, Garayannis
The process of innovation and entrepreneurship in the creation of new ventures. Access to venture capital; tax considerations; marketing new products and services. Approaches to managing small ventures, including technology-based ventures, and management for venture innovation in large and small organizations.

- 261 Human Resource Management (2)** Swiercz
Interpersonal and group dynamics in various organizational settings; direct managerial intervention in the process of organizational development. Issues and opportunities in managing outside one's own culture; executive selection and development; current personnel management practices and procedures.
- 262 Information Systems in Management (3)** Staff
A management-oriented survey of current and developing information technologies, including hardware, software, and systems development. The impact on management of the computing milieu. Information systems requirements and multimedia database approaches to handling data for business decision making.
- 263 Executive Decision Support (2)** Tarimcilar
Theory and methods of decision making in business and organizational situations. Judgmental forecasting, including statistical modeling, forward/backward planning process, conflict resolution, quality management, and value assessment. Use of computational tools, including spreadsheets, in forecasting.
- 264 Marketing Strategy (3)** Divita
Complex marketing problems involving policy and operational decisions. Marketing strategies in the perspective of environmental forces and business functions. The marketing research process. Marketing of intangibles and new and existing services, including service product decisions and planning.
- 266 Advanced Topics (2)** Staff
Problems in international finance, including the evolving international payments system and effective business practice regarding the international financial markets. International business strategies for the fast-growing economies of Southeast Asia, China, and Latin America. Strategic alliances, market entry, trade and investment, government relations, and business operations.
- 270 Strategy Formulation and Implementation (3)** Burke, Cook
Approaches to formulating strategies that enable organizations to adapt to changing social, technological, economic, and political conditions. Strategic management from the general manager's perspective; evaluation and control of strategy in various types of organizations.

EXECUTIVE LEADERSHIP IN HUMAN RESOURCE DEVELOPMENT

Doctor of Education in the field of human resource development—Prerequisite: A master's degree from an accredited college or university, three years of full-time experience in human resource development, and the general requirements for admission to Ed.D. degree candidacy stated under the Graduate School of Education and Human Development.

The program provides a forum through which doctoral Fellows, their organizations, and the University can build leadership in human resource development and bring about significant change within cooperating organizations. Fellows move through the program in a cohort group. Each cohort is a deliberate mixture of professionals from diverse industries as well as government and from a variety of geographic locations across the United States.

The program focuses on six themes that correspond to semesters, followed by work toward the dissertation. Class sessions are held one weekend a month (Friday and Saturday) for a period of two and a half years. A week-long session begins the program and an additional two-week session takes place each subsequent year. The specific time period for completing the dissertation varies.

Leadership—Fellows gain an understanding of pivotal theories of leadership and apply these theories to their own organizations. Empowerment, team development, integrity, and systems thinking are explored. There is an emphasis on the personal leadership development of the Fellows within the program.

The Learning Organization—Fellows focus on learning at both the individual and system level. Learning theory, critical thinking, and organizational learning are explored. Fellows engage in action learning projects that address a problem within their own organizations.

Research—Fellows survey the depth and breadth of current research in human resource development, focusing on areas of particular interest to themselves and their organizations and developing research skills in both quantitative and qualitative methods.

The Changing Environment—Fellows address current change theory and understanding and implementing of change in an organizational setting. Forces influencing change, such as diversity and globalization, are examined.

Integration and Application of Central Concepts—Fellows seek to integrate the knowledge they have gained in the program by applying it to a project within their own or an exchange organization. This process serves both to provide a real-world application of their knowledge and an opportunity to expand it.

Specialization: Developing In-Depth Knowledge—Fellows focus on one or two specific areas of study relevant to their organizations, themselves, and the field. Examples of topic areas are the impact of technology, autonomous work teams, retraining the work force, or the implementation of total quality management.

Fellows are required to research, write, and defend a dissertation. This research effort is an opportunity for each Fellow to make a significant contribution to the field of human resource development. The student continues to register for Dissertation Research (HRD 391) until the final oral examination has been successfully completed.

WOMEN'S STUDIES

Professors D. Bell (Director), H. Hartmann (Research), P.M. Palmer

Associate Professors C.E. Harrison, C. Deitch

Assistant Professors R. Chhibber, A. Zucker

Adjunct Assistant Professors M. Frost, B. Morris

Lecturer N. Turner

Committee on Women's Studies

D. Bell, N. Cahn, C. Deitch, C. Gamber, C.E. Harrison, H. Hartmann, L. Jacobson, N. Mikhalevsky, D. Moshenberg, P.M. Palmer, A. Romines, G. Weiss, A. Zucker

Columbian College of Arts and Sciences offers two interdisciplinary programs leading to the degrees of Master of Arts in the field of women's studies and Master of Arts in the field of public policy with a concentration in women's studies. Both programs are also available as part of J.D.-M.A. and LL.M.-M.A. joint degrees with the GW Law School. A graduate certificate in women's studies is offered as well. Programs are directed by the Committee on Women's Studies and draw upon faculty from various departments within the University and resource persons in the community.

The women's studies programs examine and integrate the contributions of established academic disciplines to provide an understanding of the historical and contemporary role and status of women, and to provide training necessary to evaluate and formulate equitable public policy for women. Each student will work closely with an advisor in designing a program to meet individual research interests and professional goals. Prospective degree candidates should consult with the director of the Women's Studies Program.

Master of Arts in the field of women's studies and Master of Arts in the field of public policy with a concentration in women's studies—Prerequisite: a bachelor's degree from an accredited college or university.

Required: the general requirements stated under Columbian College of Arts and Sciences, and 36 credit hours of course work, with or without a thesis. Policy-oriented students take WStu 221, 240, and 220, plus four courses in the public policy core (PSc 203, 229; Econ 217; and an approved statistical methods course) and 9 hours of electives. Those pursuing the Master of Arts in the field of women's studies must take WStu 220, 221, and either 225 or an approved alternative: 12 credit hours in one other discipline (history, literature, economics, philosophy, religion, anthropology, or sociology); and 9 hours of electives. With permission, other disciplinary or topical concentrations may be selected. All students take a final 6 hours chosen from WStu 299-300, or 283 and 295. All candidates are required to pass a Master's Comprehensive Examination.

Note: Excluding students enrolled in the Women's Studies Program, completion of WStu 120 and 125 or equivalent, or permission of instructor, is prerequisite to all graduate-level women's studies courses.

220 Fundamentals of Feminist Theory (3)

Palmer and Staff

Same as AmSt 220. A survey of historical theories significant to feminist thought, such as liberalism, socialism, evolution, psychoanalysis, and gendered spheres of social action. How these theories were revived and revised by the Second Wave of feminism since the 1960s. Brief examination of postmodernist and Third Wave feminist theorizing. (Fall)

- 221 **Research Issues in Women's Studies (3)** Deitch
Analysis of the contribution of feminist or gender-relations perspectives from humanities and social science disciplines to the issues and methods of social research and social policy and practice. Topics include a review of feminist frameworks, a critique and re-evaluation of traditional academic disciplines, and analysis of current research on and for women. (Fall)
- 225 **Contemporary Feminist Theory (3)** Staff
Developments in feminist theory in the past 20 years, with a primary focus on American feminism and some consideration of European and Third World thought.
- 230 **Global Feminisms (3)** Bell and Staff
The individuals, groups, and policies that shape global agenda for women; local and international fora in which global feminisms are forged.
- 238 **Feminist Ethics and Policy Implications (3)** Weiss
Same as Phil 238.
- 240 **Women and Public Policy (3)** Harrison, Deitch
Analysis of gender-related U.S. policy issues, such as domestic violence, military service, abortion rights, equal employment opportunity, child and dependent care, welfare, social security, and international development assistance. (Spring)
- 241 **Women and the Law (3)** Harrison
Legal status of women in the United States on both the federal and state levels. Emphasis on constitutional equality, employment law, family law, reproduction and sexuality, and the criminal justice system. (Fall)
- 251 **Women and Writing (3)** Staff
Same as Engl 251.
- 257 **Gender and Sexuality (3)** Bell
Same as Anth 257.
- 265 **Women, Welfare, and Poverty (3)** Deitch, Harrison
Examination of how the causes and consequences of poverty differ for women and men; how race, class, and gender shape policy responses to poverty. The history of family assistance policy in the United States and the impact of various welfare reform efforts. Same as Soc 265. (Fall)
- 270 **Seminar: Selected Topics (3)** Bell and Staff
Investigation of a current policy issue of particular concern to women, or consideration of women's status in a particular social system. Topics have included women and health; sexualities; women and Judaism; black women; gender, race, and class. May be repeated for credit. (Fall and spring)
- 273 **Readings on Women in American History (3)** Harrison
Same as AmSt/Hist 273.
- 280 **Independent Study (3)** Staff
May be repeated for credit. Arrangements must be made with sponsoring faculty member prior to registration.
- 283 **Practicum in Women's Studies (3 to 6)** Deitch
Study of the changing status of women through supervised assignment to public and private agencies engaged in policymaking, education, political action, and research. Placement arrangements must be made the semester prior to registration; departmental permission is required. May be repeated for credit to a maximum of 6 credits. (Spring)
- 295 **Independent Research in Women's Studies (arr.)** Staff
Individual library or field research. Arrangements must be made with the sponsoring faculty member prior to registration; a written proposal is required.
- 299-300 **Thesis Research (3-3)** Staff

Faculty

FACULTY AND STAFF OF INSTRUCTION 2001-2002

(as of Fall 2001)

Columbian College of Arts and Sciences

School of Business and Public Management

Graduate School of Education and Human Development

School of Engineering and Applied Science

Elliott School of International Affairs

EMERITI

Lewis Francis Affronti, *Professor Emeritus of Microbiology and Immunology*

B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke University

Frederick Amling, *Professor Emeritus of Business Finance*

B.A. 1948, Baldwin-Wallace College; M.B.A. 1949, Miami University; Ph.D. 1957, University of Pennsylvania

Galip Mehmet Arkilic, *Professor Emeritus of Engineering and Applied Science*

B.S. in M.E. 1946, Cornell University; M.S. 1947, Illinois Institute of Technology; Ph.D. 1954, Northwestern University

David Lynn Atkins, *Professor Emeritus of Biology*

B.A. 1957, University of Texas; M.A. 1963, East Texas State University; Ph.D. 1970, Texas A&M University

Robert Edward Baker, *Professor Emeritus of Education*

B.S. in Ed. 1939, State University of New York at Buffalo; M.A. 1954, Catholic University of America; M.A. in Ed. 1956, Ed.D. 1962, George Washington University

Ruth Lillian Aaronson Bari, *Professor Emeritus of Mathematics*

B.A. 1939, City University of New York, Brooklyn College; M.A. 1943, Ph.D. 1966, Johns Hopkins University

Shirley Russell Barnett, *Associate Professor Emeritus of Spanish*

B.A. 1944, Vassar College; M.A. 1946, Vanderbilt University; Ph.D. 1958, University of Minnesota

Otto Bergmann, *Professor Emeritus of Physics*

Ph.D. 1949, University of Vienna

Nancy Joan Belknap, *Professor Emeritus of Special Education*

B.S. 1966, University of Michigan; M.A. in Ed. 1970, George Washington University; Ed.D. 1978, American University

Lee Sheward Bielski, *Professor Emeritus of Speech Communication*

B.S. 1940, Ohio University; M.A. 1944, University of Michigan

Giorgio Vittorio Borgiotti, *Professor Emeritus of Engineering and Applied Science*

Eng.Dr. 1957, University of Rome

John Gordon Boswell, *Professor Emeritus of Education*

B.A. in Ed. 1953, M.A. in Ed. 1956, Ed.D. 1963, George Washington University

Lloyd Spencer Bowling, *Professor Emeritus of Speech and Hearing*

B.A. 1954, M.A. 1957, Ed.D. 1964, University of Maryland

Marcella Brenner, *Professor Emeritus of Education*

B.S. in Ed. 1934, Johns Hopkins University; M.A. 1949, American University; Ed.D. 1962, George Washington University

David Springer Brown, *Professor Emeritus of Management*

B.A. 1936, University of Maine at Orono; Ph.D. 1955, Syracuse University

Frederick James Brown, Jr., *Professor Emeritus of Education*

B.A. 1947, M.Ed. 1951, Western Maryland College; Ed.D. 1962, Columbia University

Robert Guy Brown, *Professor Emeritus of Sociology*

B.A. 1949, University of Rhode Island; M.A. 1951, Ph.D. 1960, University of North Carolina

James Franklin Burks, *Professor Emeritus of French*

B.A. 1951, M.A. 1952, University of Cincinnati; Ph.D. 1957, Indiana University

- Elizabeth Burtner, *Professor Emeritus of Physical Education***
B.A. 1927, Hood College; M.A. 1935, Columbia University
- Willard Edmund Caldwell, *Professor Emeritus of Psychology***
B.A. 1940, M.A. 1941, University of Florida; Ph.D. 1946, Cornell University
- Ali Bulent Cambel, *Professor Emeritus of Engineering and Applied Science***
B.S. 1942, Robert College, Turkey; M.S. 1946, California Institute of Technology; Ph.D. 1950, University of Iowa
- Bayard Lacey Catron, *Professor Emeritus of Public Administration***
B.A. 1963, Grinnell College; M.A. 1965, University of Chicago; M.C.P. 1972, Ph.D. 1975, University of California, Berkeley
- Mary Ann Bieter Coffland, *Associate Professor Emeritus of Romance Languages***
B.A. 1952, College of St. Catherine; M.A. 1957, Ph.D. 1965, University of Minnesota
- Victor Hugo Cohn, *Professor Emeritus of Pharmacology***
B.S. 1952, Lehigh University; M.A. 1954, Harvard University; Ph.D. 1961, George Washington University
- Mary Ellen Coleman, *Professor Emeritus of Education***
B.S. 1937, Madison College; M.A. in Ed. 1950, George Washington University
- Thomas Francis Courtless, Jr., *Professor Emeritus of Sociology***
B.A. 1955, Pennsylvania State University; M.A. 1960, Ph.D. 1966, University of Maryland
- Linda Grant DePauw, *Professor Emeritus of American History***
B.A. 1961, Swarthmore College; Ph.D. 1964, Johns Hopkins University
- James Fearing Dinwiddie, *Professor Emeritus of Engineering Management***
B.S. 1948, Carnegie Institute of Technology; M.S. 1956, North Carolina State University; M.S. 1966, Ph.D. 1972, Stanford University
- Miriam Violet Wein Dow, *Assistant Professor Emeritus of English***
B.A. 1959, University of Akron; M.A. 1960, University of Michigan; Ph.D. 1977, University of Maryland
- Roy Brandon Eastin, *Professor Emeritus of Business Administration***
B.A. 1943, M.A. 1945, George Washington University; Ph.D. 1953, American University
- John Eftis, *Professor Emeritus of Engineering and Applied Science***
B.C.E. 1952, City University of New York, City College; M.S. in C.E. 1958, Columbia University; D.Sc. 1967, George Washington University
- Marvin F. Eisenberg, *Professor Emeritus of Engineering and Applied Science***
B.S. in E.E. 1953, University of Miami; M.S. in Engr. 1954, Ph.D. 1961, University of Florida; P.E.
- Julian Eisenstein, *Professor Emeritus of Physics***
B.S. 1941, M.A. 1942, Ph.D. 1948, Harvard University
- Rodney Walter Eldridge, *Professor Emeritus of International Finance***
B.A. 1949, M.A. 1959, University of Vermont; Ph.D. 1966, Columbia University
- Charles Fox Elliott, *Associate Professor Emeritus of Political Science and International Affairs***
B.A. 1953, Ph.D. 1964, Harvard University; M.A. 1958, University of California, Berkeley
- Lloyd Hartman Elliott, *Professor Emeritus of Higher Education; President Emeritus of the University***
B.A. 1937, Glenville State College; M.A. 1939, LL.D. 1967, West Virginia University; Ed.D. 1948, University of Colorado; LL.D. 1963, University of New Hampshire; LL.D. 1965, Colby College; LL.D. 1966, Concord College; LL.D. 1969, University of Maine at Orono; LL.D. 1970, Husson College; LL.D. 1971, Georgetown University; LL.D. 1986, West Virginia Institute of Technology; D.H.C. 1986, Kansai University, Japan; LL.D. 1988, American University
- Donald Michael Esterling, *Professor Emeritus of Engineering***
B.S. 1964, University of Notre Dame; M.A. 1966, Ph.D. 1968, Brandeis University
- James Elmer Feir, *Professor Emeritus of Civil Engineering***
B.S. 1950, University of Alberta, Canada; M.S. 1955, University of London; Ph.D. 1966, Cambridge University
- Anthony Vincent Fiacco, *Professor Emeritus of Operations Research and Applied Science***
B.A. 1950, Union College, New York; Ph.D. 1967, Northwestern University
- Nicolae Filipescu, *Professor Emeritus of Chemistry***
Ph.D. 1957, University of Industrial Chemistry, Polytechnical Institute, Romania; Ph.D. 1964, M.D. 1975, George Washington University
- Roderick Stuart French, *Professor Emeritus of Philosophy; Vice President Emeritus for Academic Affairs***
B.A. 1954, Kenyon College; M.Div. 1957, Episcopal Divinity School; S.T.M. 1965, Union Theological Seminary; Ph.D. 1971, George Washington University
- Arthur Daniel Friedman, *Professor Emeritus of Engineering and Applied Science***
B.A. 1961, B.S. in E.E. 1962, M.S. in E.E. 1963, Ph.D. 1965, Columbia University

- Michael Graham Gallagher, *Professor Emeritus of Accountancy***
B.A. in Govt. 1960, J.D. 1964, LL.M. 1971, George Washington University; C.P.A. 1965, State of Virginia
- Lyndale Harpster George, *Associate Professor Emeritus of Human Kinetics and Leisure Studies***
B.S. in P.E. 1948, M.A. in Ed. 1952, A.P.C. 1961, George Washington University
- Marvin Gordon, *Professor Emeritus of Geography and Regional Science***
B.A. 1942, City University of New York, City College; M.A. 1954, Ph.D. 1966, Columbia University
- Robert Goulard, *Professor Emeritus of Engineering and Applied Science***
Ph.D. 1957, Purdue University
- Joseph Arthur Greenberg, *Professor Emeritus of Education***
B.S. in Bus.Ed. 1966, Salem State College; Ed.M. 1968, Ed.D. 1974, Boston University
- Donald Gross, *Professor Emeritus of Operations Research***
B.S. 1956, Carnegie Mellon University; M.S. 1959, Ph.D. 1962, Cornell University; P.E.
- Phillip Donald Grub, *Aryamehr Professor Emeritus of Multinational Management***
B.A., B.A. in Ed. 1953, Eastern Washington State College; M.B.A. 1960, D.B.A. 1964, George Washington University
- Robert Bernard Heller, *Professor Emeritus of Engineering and Applied Science***
B.S. 1946, M.S. 1948, Ph.D. 1951, St. Louis University
- Charles Joseph Herber, *Associate Professor Emeritus of European History and International Affairs***
B.A. 1952, Dickinson College; M.A. 1957, Ph.D. 1965, University of California, Berkeley
- Philip Henry Highfill, Jr., *Professor Emeritus of English***
B.A. 1942, Wake Forest University; M.A. 1948, Ph.D. 1950, University of North Carolina
- Peter Proal Hill, *Professor Emeritus of History and International Affairs: University Historian***
B.A. 1949, Tufts University; M.A. 1954, Boston University; Ph.D. 1966, George Washington University
- James William Hillis, *Professor Emeritus of Speech and Hearing***
B.S. 1952, University of Nebraska; M.A. 1957, University of Maryland; Ph.D. 1963, Ohio State University
- Denis Michael Hitchcock, *Associate Professor Emeritus of Art***
B.A. 1967, University of California, Los Angeles; M.F.A. 1970, Ph.D. 1977, Princeton University
- Herman Hedberg Hobbs, *Professor Emeritus of Physics***
B.S. 1953; M.S. 1955, George Washington University; Ph.D. 1958, University of Virginia
- Mary Alida Holman, *Professor Emeritus of Economics***
B.A. 1955, M.A. 1957, Ph.D. 1963, George Washington University
- Robert William Holmstrom, *Professor Emeritus of Psychology***
B.A. 1956, Trinity College (Connecticut); Ph.D. 1965, Duke University
- Gloria Lyon Horrworth, *Professor Emeritus of Education***
B.A. 1952, California State University, Los Angeles; M.A. 1961, California State University, Northridge; Ed.D. 1972, American University
- Ching-Yao Hsieh, *Professor Emeritus of Economics***
B.A. 1939, St. John's University, China; M.A. 1958, Ph.D. 1964, George Washington University
- Terry Lee Hufford, *Professor Emeritus of Botany***
B.S. 1961, M.A. 1962, Bowling Green State University; Ph.D. 1972, Ohio State University
- Robert Lee Humphrey, *Professor Emeritus of Anthropology***
B.A. 1962, American University; Ph.D. 1970, University of New Mexico
- Rita Klein Ives, *Professor Emeritus of Special Education***
B.S. 1953, University of Pittsburgh; M.A. in Ed. 1957, Ed.S. 1967, Ed.D. 1971, George Washington University
- Joe Lee Jessup, *Professor Emeritus of Business Administration***
B.S. in B.A. 1936, University of Alabama; M.B.A. 1941, Harvard University; LL.D. 1964, University of Chungang, Korea
- Eva Mayne Johnson, *Professor Emeritus of Psychology***
B.A. 1949, M.A. 1951, Ph.D. 1957, George Washington University
- Nancy Diers Johnson, *Associate Professor Emeritus of Dance***
B.S. 1955, University of Minnesota; M.A. 1966, University of Iowa; Ed.D. 1980, University of North Carolina at Greensboro
- William Reid Johnson, *Associate Professor Emeritus of History and International Affairs***
B.A. 1951, Oberlin College; M.A. 1955, Ph.D. 1961, University of Washington
- Robert Gean Jones, *Professor Emeritus of Religion***
B.A. 1947, Baylor University; B.D. 1950, M.A. 1957, Ph.D. 1959, Yale University

- Stephen Arnold Karp, *Professor Emeritus of Psychology***
B.A. 1949, City University of New York, Brooklyn College; M.A. 1952, New School for Social Research; Ph.D. 1962, New York University
- Samuel Kavruck, *Professor Emeritus of Education***
B.S. 1937, M.S. in Ed. 1939, City University of New York, City College; M.A. in Govt. 1950, Ed.D. 1954, George Washington University
- John Kaye, *Professor Emeritus of Engineering and Applied Science***
B.S. in M.E. 1939, M.S. in M.E. 1948, California Institute of Technology
- John Whitefield Kendrick, *Professor Emeritus of Economics***
B.A. 1937, M.A. 1939, University of North Carolina; Ph.D. 1955, George Washington University
- Robert Wayne Kenny, *Professor Emeritus of History***
B.J. 1953, University of Texas; M.A. 1957, University of Minnesota; Ph.D. 1963, University of Chicago; M.F.A. 1984, George Washington University
- Young C. Kim, *Professor Emeritus of Political Science and International Affairs***
M.A. 1956, Vanderbilt University; Ph.D. 1958, University of Pennsylvania
- Phyllis Dawn Kind, *Professor Emeritus of Microbiology and Immunology and of Genetics***
B.A. 1955, Montana State University; M.S. 1956, Ph.D. 1960, University of Michigan
- James Cecil King, *Professor Emeritus of German***
B.A. 1949, M.A. 1950, Ph.D. 1954, George Washington University
- Ali Muhlis Kiper, *Professor Emeritus of Engineering***
M.S. in M.E. 1950, Technical University of Istanbul, Turkey; M.S. in M.E. 1954, Ph.D. 1956, Purdue University; P.E.
- Virginia Randolph Kirkbride, *Professor Emeritus of Educational Psychology***
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School of Medicine and Health Sciences: Bachelor of Science in Health Sciences (B.S.H.S.), Master of Science in Health Sciences (M.S.H.S.), and Doctor of Medicine (M.D.)

Law School: Juris Doctor (J.D.), Master of Laws (LL.M.), and Doctor of Juridical Science (S.J.D.)

School of Engineering and Applied Science: Bachelor of Science (Civil Engineering) (B.S.[C.E.]), Bachelor of Science (Computer Engineering) (B.S.[C.Eng.]), Bachelor of Science (Computer Science) (B.S.[C.S.]), Bachelor of Science (Electrical Engineering) (B.S.[E.E.]), Bachelor of Science (Mechanical Engineering) (B.S.[M.E.]), Bachelor of Science (Systems Engineering) (B.S. [S.E.]), Bachelor of Arts (B.A.), Master of Engineering Management (M.E.M.), Master of Science (M.S.), Engineer (Engr.), Applied Scientist (App.Sc.), and Doctor of Science (D.Sc.)

Graduate School of Education and Human Development: Master of Arts in Education and Human Development (M.A. in Ed.&H.D.), Master of Arts in Teaching (M.A.T.), Master of Education (M.Ed.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

School of Business and Public Management: Bachelor of Accountancy (B.Accy.), Bachelor of Business Administration (B.B.A.), Master of Accountancy (M.Accy.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Public Policy (M.P.P.), Master of Science in Finance (M.S.F.), Master of Science in Information Systems Technology (M.S.I.S.T.), Master of Science in Project Management (M.S.P.M.), Master of Tourism Administration (M.T.A.), and Doctor of Philosophy (Ph.D.)

Elliott School of International Affairs: Bachelor of Arts (B.A.), Master of Arts (M.A.), Master of International Policy and Practice (M.I.P.P.), and Master of International Studies (M.I.S.)

School of Public Health and Health Services: Bachelor of Science (B.S.), Master of Science (M.S.), Master of Public Health (M.P.H.), Master of Health Services Administration (M.H.S.A.), Specialist in Health Services Administration (Spec.H.S.A.), and Doctor of Public Health (Dr.P.H.)



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THE GEORGE WASHINGTON UNIVERSITY WASHINGTON DC



1. Academic Center, 801 22nd St.
A. Phillips Hall
B. Rome Hall
C. Smith Hall of Art
D. Visitor Center
2. John Quincy Adams House
2129-33 Eye St.
3. Alumni House, 1925 F St.
4. Hortense Amsterdam House
2110 G St.
5. Bell Hall, 2029 G St.
6. Corcoran Hall, 725 21st St.
7. Crawford Hall, 2119 H St.
8. Dakota, 2100 F St.
9. Davis-Hodgkins House
609 21st St.
10. Fulbright Hall, 2223 H St.
11. Fonger Hall, 2201 G St.
12. Government, Hall of
710 21st St.
13. GSEHD, 2134 G St.
14. Guthridge Hall, 2115 F St.
15. The George Washington
University Club, 1918 F St.
16. The George Washington
University Inn
824 New Hampshire Ave.
17. Hospital, University,
901 23rd St.
18. Kennedy Onassis Hall
2222 Eye St.
19. Key Hall, 600 20th St.
20. Lafayette Hall, 2100 Eye St.
(Formerly Adams Hall)
21. Lenthall Houses
606-610 21st St.

22. Lerner Hall, 2000 H St.
23. Lerner Family Health and
Wellness Center, 2301 G St.

LIBRARIES

24. Jacob Burns (Law), 716 20th St.
25. Melvin Gelman (University),
2130 H St.
26. Paul Himmelfarb Health
Sciences (Medical), 2300 Eye St.
27. Lerner Auditorium, 730 21st St.
28. Lerner Hall, 2023 G St.
29. Madison Hall, 736 22nd St.
30. Marvin Center, 800 21st St.
31. Medical Faculty Associates
2150 Pennsylvania Ave.
A. H.B. Burns Memorial Bldg.
B. Ambulatory Care Center,
32. Media & Public Affairs
805 21st St.
33. Mitchell Hall, 514 19th St.
34. Monroe Hall, 2115 G St.
35. Munson Hall, 2212 Eye St.
36. New Hall, 2350 H St.
37. Old Main, 1922 F St.
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39. Rice Hall, 2121 Eye St.
40. Riverside Towers Hall
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41. Ross Hall, 2300 Eye St.
42. Samson Hall, 2036 H St.,
729 21st St.
43. Schenley Hall, 2121 H St.
44. Smith Center, 600 22nd St.
45. Staughton Hall, 707 22nd St.

46. Stockton Hall, 720 20th St.
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49. Student Health Service
2150 Pennsylvania Ave.
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51. Thurston Hall, 1900 F St.
52. Tompkins Hall of Engineering
725 23rd St.
53. University Garage, 2211 H St.
54. Warwick Bldg., 2300 K St.
55. The West End, 2124 Eye St.
56. Woodhull House, 2033 G St.
57. 700 20th St.
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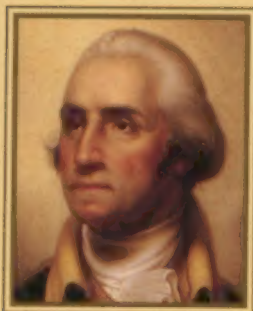
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90. 2140 G St.
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- Marvin Center (See #30)
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